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Expansion of the vocational agriculture program to include education for off-farm agricultural occupations has placed increasing demands on existing facilities for agricultural programs. The facility requirements of the new curriculums are often not met by the existing facilities. Vocational agriculture teachers, state supervisory staff members, and teacher educators assisted a vocational education media center in development of this publication for use by school administrators, architects, state department personnel, teachers, and others interested in setting up new programs. The document includes sections on: General Specifications, Production Agriculture, Agricultural Mechanics, Ornamental Horticulture and Floriculture, Agricultural Sales and Services and Agricultural Chemicals, Livestock Management, and Forestry and Pulpwood Production. Where more than one agricultural curriculum will be offered, modifications are necessary to meet specifications of all included curriculums. The document is illustrated and contain s tables of equipment requirements. Each curriculum section includes space requirements, classroom needs, equipment and supply needs, teacher office space, storage area needs, electrical requirements, library, washroom, laboratory needs, farm area needs, and suggested plans. (DM)

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FACILITIES FOR AGRICULTURAL EDUCATION CURRICULUMS

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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FOREWORD

In recent years the ever expanding program of vocational education in agriculture has placed increasing demands on the existing facilities for agricultural programs. The facility requirements of the new curriculums in agricultural education cannot in many respects be met by the existing facilities designed for the production agriculture curriculum. The equipment and supplies needed for the newer curriculums are also quite different.

Assisting the staff of the Vocational Education Media Center in the development of this publication were the teachers of agriculture, the state supervisory staff for agricultural education and teacher educators. Sincere appreciation is expressed to these persons for their valuable contributions in this endeavor.

This publication is designed for use by school administrators, architects, state department personnel, teachers and other interested persons in setting up new programs and the revision of existing programs, so that the facility and equipment requirements of the new curriculums can be met, enabling the teacher to provide the best education possible for the students.

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INTRODUCTION

With the advent of the area vocational centers the specific facility and equipment requirements of each agricultural education curriculum are needed. So that any new programs set up, in these centers, will be adequately equipped to provide the education needed for job entry and advancement.

Each agricultural education curriculum is considered separately within this publication. This was done to simplify the use of this publication when it is used in setting up new curriculums in area vocational centers.

In situations where more than one of the agricultural curriculums is to be included within the same school program, appropriate modifications to the facilities for the included programs must be made so that the facility and equipment requirements of all included curriculums will be met.

In the situation where production agriculture is the main program, it is desired to add emphasis training from one of the other curriculum areas; then the standards for the emphasis curriculum must be checked to determine what modifications and additions to the production agriculture facility and equipment must be made to adequately provide both the production agriculture and the emphasis area education and training.

GENERAL SPECIFICATIONS

In this section we will consider some of the areas of construction and equipment which will not change from curriculum to curriculum.

TYPE OF CONSTRUCTION

The agricultural education facility should conform to the existing architecture of the overall school plant and should be of similar design and construction.

WALLS, CEILINGS AND ROOF

Within the shop areas the ceilings should be at least 16' high to provide a shop-entrance service door 14' high. The roof should be designed to carry a monorail and a 6,000 pound hoist over the open area of the shop. The roof should be self supporting as columns within the shop area are undesirable. A 16' ceiling height will also allow the construction of overhead storage facilities above the office, tool room, restroom and classroom as needed.

LIGHTING

Florescent type light, free of glare or shadows, is recommended. Lighting should conform to minimum state specifications in all areas of the facility.

VENTILATION AND ENVIRONMENTAL CONTROL

Artificial ventilation is needed in the shop to remove smoke, fumes, and gases. The heating and cooling of the facility should be individually room controlled. Whenever possible, the facility should be air conditioned.

ELECTRICAL POWER REQUIREMENTS

The service entrance should be adequate for present needs with provisions for future requirements.

Determine if the facility is being supplied with single phase and/or three phase current. All equipment for the facility should be ordered to match the current being supplied. Three phase equipment is recommended where applicable due to its lower initial cost.

Throughout the facility color coding of electrical switches and all other equipment is recommended.

Grounded duplex outlets 110 v., 20 amps. are recommended throughout the facility, their number and locations vary with curriculum and will be indicated in each section.

WINDOWS

All window sills in the shop should be at least 72" from floor; this will help prevent outside distractions. This height will allow adequate light and ventilation and also allow for the placement of wall cabinets and wall benches.

The window sill should slope downward at about a 45 degree angle. This will help prevent the accumulation of dirt and debris, and students will be unable to lay tools and other items on the window sill.

In the event that the shop is a windowless building, skylights or some other provisions for natural lighting should be made.

Windows in the classroom should conform to the size and type used in the overall building.

The remainder of the publication is arranged in six sections to cover the nine curriculums in vocational agricultural education. Six of the curriculums are grouped in three groups of two each due to the great similarity of facility and equipment requirements of the curriculums.

The recommended facilities and quipment are presented as follows in the following sections of this publication:

SECTION:
1. Production Agriculture
2. Agricultural Mechanics
3. Ornamental Horticulture and Floriculture
4. Agricultural Sales and Services and Agricultural Chemicals
5. Livestock Management
6. Forestry and Pulpwood Production

Each section will cover the areas of space requirements, specialized equipment, suggested equipment and supplies and a suggested floor plan to adequately meet the requirements of the curriculum.

SECTION 1 - PRODUCTION AGRICULTURE

The production agriculture facility is designed for the situation where it will be the only vocational agricultural educational curriculum taught in the school. The facility is based on the circumstance where there is only one teacher. In multiple teacher departments each teacher should have an individual office and where scheduling requires that each teacher meet a class during the same period, additional classroom facilities must be provided.

SPACE REQUIREMENTS

Facility Section	Recommended Area (Sq. ft.)
Classroom	960-1050
Teacher Office	150- 180
Classroom Storage	150- 180
Library	150- 180
Washroom	100- 150
Mechanics Laboratory	2800-3200
Laboratory Storage	
tool room	150- 180
supplies storage	50- 75
overhead storage	300- 360
Outside Paved Area	5000-5500
Outside Covered Shed	1200-1500
Land Laboratory	1-10 Acres

The following parts of this section will outline the equipment required for the various areas of the facility, some of the special requirements of the areas and a recommended list of tools and supplies.

CLASSROOM:

I. Equipment

1. Tables and chairs, or arm chairs for projected class size
2. Laboratory table or desk at front for teacher with a sink and water connections
3. Chalkboard, 3 1/2' x 20' at front, 36" from floor to chalktray
4. Tackboard, 3 1/2' x 10' at side or rear of classroom near entrance door, 36" from floor to bottom of tackboard
5. Projection screen, daylight type, 70" x 70", ceiling mounted or wall mounted, 8'-10' from floor to top of screen, with bracket to adjust for keystone effect when used with the overhead projector
6. Each window equipped with shades, twi-nighter venetian blinds or blackout curtains so room can be darkened when using projection equipment
7. Notebook rack, to be of sufficient size to provide storage of all students notebooks (one space per student enrolled in the curriculum)

II. Audio-Visual Equipment

1. Projection table
2. Overhead projector with projection table
3. Slide and film strip projector
4. Tape recorder
5. 35 mm camera
6. The following items to be provided if they are not readily available for use from the school visual aids or library department
    - (a) 16 mm movie projector
    - (b) Super 8 mm movie projector for film loops
    - (c) Opaque projector

III. Tools, Equipment and Supplies

CLASSROOM

ITEM	DESCRIPTION----------SIZE	NUMBER
Cabinet	Slide and filmstrip storage	1
Aids	Slides, strips, transparencies	Collection
Chart files	For large charts	1
Viewer	For slides and filmstrips	1
Loud speaker	Portable	1
Heating plate	Gas or electric	1
Microscope	Teaching, revolving	1
Scale	Utility, 60 pounds	1
Scale	Hanging, 100-300 pounds	1
Boards	Drawing boards, 17" x 22" (triangles and T-square)	1*
Beakers, graduated cylinders, evaporating dish, test tubes, mortar and pestle, glass tubing, flasks		Assort.
Lab Magnifier	Double lens	1

*One per student

LIVESTOCK

ITEM	DESCRIPTION---------SIZE	NUMBER
Charts, agricultural	Internal organs of cow, 30 x 40	1
	Internal organs of hen, 30 x 40	1
	Internal organs of hog, 30 x 40	1
	Parts of dairy cow, 30 x 40	1
	Egg chart, 30 x 40	1
	Nitrogen cycle, 30 x 40	1
Hog models	Set of five hog grade models	1
Hog exhibit	Life history of hog roundworm	1
Thermometer	Clinical thermometer	1
Cattle leader	Cattle nose leader	1
Hoof parer	14" long	1
Hoof nipper	14" long	1
Hoof knife	Searcher knife (right or left hand)	1
Emasculator	13" to 16"	1
Ear tatoo	3/8" letters	1
Ear tag pliers	Applicator for cattle ear tags	1
Hog holder		1
Hog ringer	Automatic	1
Clipmaster	Electric animal clipper	1
Dehorner	Electric dehorner	1
Ear notcher hogs		1
Egg candler and grader	Combination candler and grader	1
Brooder	100 chick brooder (teaching animal nutrition)	1
Foot bath	Sanitary foot bath	1
Branding	Freeze Branding - 4" numbers	1 set
Chute & scales	Squeeze chute & scales combination	1

CROPS AND SOILS AREAS

Plant food kit	Demonstration kit	1
Garden insects	Insect collection, 24 species	1
Grain insects	Insects of stored grain, collection	1
Weed seed	Bottled collection of 10-12 common weed seeds	1
Soil classes	Collection of soil classes	1
Soil separates	Collection of 6 soil separates	1
Thermometer	Grain bin thermometer	1
Psychrometer	Sling psychrometer (testing relative humidity)	1

ITEM	DESCRIPTION-------SIZE	NUMBER
Probe	Deep bin probe	1
Moisture tester	For testing moisture of grain and beans	1
Weight tester	Weight per bushel tester	1
Seives	Hand seives	4
Germinator	Deluxe germinator	1
Thermometer	Soil thermometer	1
Soil test kit	Testing kit for simple tests	1
Soil auger	Soil auger, 42" long, 6" bit	1
Soil collection	Residual soil collection, 10 samples	1
Soil seives	Soil seives	1
Measuring tape	100' steel tape	1
Hand level	Hand sighting level	1
Fertilizer samples	Set of 18 samples	1
Grass seed	Collection of 12 types of grass seed	1
Legume seed	Collection of 12 types of legume seed	1
Plant tester	Plant tissue test	1

HORTICULTURE AND FORESTRY AREAS

Pruning saws	Short - 14"	2
Pruning saws	Pole pruning saw - 18'	2
Pruning shears	Hand pruner	15
Pruning shears	26" looper	4
Grafting knives	Grafting and budding	6
Grub hoes	Blade 3 3/4" x 8"	4
Spray pump	Rust resistant, 2-4 gallons	1
Hedge shearers	Long handled 21"	2
Hoes	Garden hoes	6
Rakes	Garden rakes	4
Shovels	Straight neck, round point	4
Picks	Railroad picks	4
Electric cable	For electric hotbeds (plastic) 50'	2
Opener	Can opener	1
Wheel barrow	4 cubic feet	2
Garden hose	3/4", 25' with nozzle	2
Trowels	Transplanting	4
Can snips	(For opening side of cans)	15
Seeder	Cyclone seed and fertilizer sower	1

ITEM	DESCRIPTION---------SIZE	NUMBER
Scales	Seed scales	1
Duster	Garden, Aluminum	1
Respirator	Spray	1
Respirator	Dust	1
Roller	Lawn roller, 24"	1
Spreader	Fertilizer, 3'-4'	1
Tractor	Roto spader, 5 hp	1
Kit	Soil testing (Sudburry)	1
Sprayer	Power sprayer, 15 gal., gasoline powered	1
Shovel	D handle, square point, 10"	3
Shovel	D handle, round point	3
Shovel	D handle, square point with steel strap, 7"	3
Mattock	5 lb.	2
Rolls	Lath, 6' width, 50' long	15
Lamp	Gro-lux, 4' long	4
Planting bars or mattocks	Blade 10" x 3" x 3/4"	6
Fire rakes		4
Fire pumps	5 gallons, galvanized	2
Fire swatters	Flap 12" x 15"	4
Brush hooks	Double edge	1
Power saws	Chain saw, 16"-18"	4
Axes	3 1/2" blade	4
Increment borer	At least 11" bore	6
Spray gun	For marking trees	1
Crusier sticks	Biltmore-Crusier, 37"	1
Altimeter		6
Gauge	Bark thickness	1
Saw	30" bow	1
Calipers	Wood	1
Compass	Selva Cambler	6
Tape	Diameter tape	1
Gauge	Basal Area Angle	1
Sprayer	Compression Sprayer, 3 gal.	1
Tape	Steel, 100'	2
Rule	Tree & log seal stick	6
Seals	Triangular seals	6
Equipment for a greenhouse (Approx. 20' x 50') Exhaust fan	30" to 40" with air tube and motarized shutter and louver for exhaust	1
Faucet	Hose bib, 3/4" x 3/4"	4
Boxes	Breaker boxes (check with electrician)	2

ITEM	DESCRIPTION------SIZE	NUMBER
Pipe	Galvanized, 3/4", 21' long	3
Heater	100,000 to 125,000 BTU and thermostat	1
Controls	Stack controls for heater	1
Sprinklers pipe	All fixtures necessary for sprinkling	1
Wire	Wiring fixtures for house	1
Tank	500 gallon fuel tank (set on concrete)	1
Shredder	Soil shredder, 1/2 hp	1
Nozzles	Mister, 100 mist nozzles	12
Sterilizer	Soil sterilizer, 1/8 yd.	1
Timer	Control clock, 24 hr.	1
Timer	Short internal clock, 5 min.	1
Strainer	3/4" strainer	1
Valve	3/4" solenoid valve	1
Thermostats	GE Z 48558 - 481c112 - 2LD	4

CONSUMABLE SUPPLIES

This list contains some of the consumable supplies that should be available.

Flats	Metal	50
Labels	Plastic	1000
Moss	Peat moss	15 bales
Chemicals	Spray, dusting, weed killing	Assort.
Plants	Stock, new varieties	Assort.
Pearlite	Bags, 25 lbs.	6
Packs	Market, #42	200
Pots	3" or 4", metal, clay or plastic	2000
Pellets	Jiffy Peat Pellets	2000
Plastic	Polyethylene 10' wide clear	2 rolls
Plastic	Polyethylene 14' wide black	50'
Fertilizer	Liquid, artho, azalea plant food	Assort.
Fertilizer	Armor 60% urea, granular, 16-4-8	Assort.
Twine	Waxed wrapping twine	1 roll
Killer	Weed (tree) 2, 4-5 T	2 gal.
Paint	Tree marking	1 gal.
Repellant	Insect	as needed
Oil	Fuel	as needed

TEACHER OFFICE

I. Equipment

1. Office desk, steel, 3 drawers on one side and single drawer and file drawer on other side, with a large center drawer

2. Desk chair with casters, padded seat and back
3. Telephone
4. Adding machine
5. Typewriter with portable table
6. Two side chairs
7. Bookcase
8. 2-4 drawer steel filing cabinets

II. Teacher Office Supplies

ITEM	DESCRIPTION--------SIZE	NUMBER
Punch	Hand-hole punch	1
Guide	Lettering guide	1
Pens	Lettering (marking) pens 1/8" and 1/4"	2

CLASSROOM STORAGE AREA

1. Adjustable shelves on three walls for storage of teaching materials and supplies.
2. Large cabinet for storage of audio-visual equipment and other teaching materials such as charts, graphs, films, etc.
3. Table, approx. 3' x 6' x 30", for set up and testing of visual aids equipment.

LIBRARY

1. Library tables and chairs for students using the library area
2. Adjustable shelves on walls for storage of student reference materials
3. Magazine rack
4. Bulletin storage cabinet or rack

WASHROOM

Commodes, urinals and sinks as needed. The space requirements will vary according to the numbers of students enrolled and the availability of other sanitary facilities in the school.

MECHANICS LABORATORY

The mechanics laboratory should have one large service door leading to the outside paved area, size 14' high x 16' wide. There should be a small 36" door along side the large service door leading to outside paved area. Direct access from classroom and teacher office is desirable. At least one floor drain should be provided near center of open work space with concrete floor adequately sloped for proper drainage.

The welding area should be shielded from the remainder of the shop and contain adequate ventilation to remove the smoke and fumes created by the welding process.

Over the office, tool room, washroom and, if required, the classroom, storage should be provided for lumber, metal and other large materials needed for use by the students. Racks, either wall or free standing, should be provided for storage of these materials. The tool room, office, washroom and classroom should have 8' ceilings, as higher ceilings will result in wasted space and loss of badly needed storage space.

The air compressor should be permanently located with quick-connect outlets every 20' around the shop on the walls.

A sink for student clean up should be provided in the laboratory area.

I. STATIONARY EQUIPMENT

MECHANICS LABORATORY

ITEM	DESCRIPTION-------SIZE	NUMBER
Bandsaw	Horizontal, metal cutting, 8" capacity, 1 hp	1
Bench	Work, 2 man	as needed
Bench	Work, 4 man	as needed
Cleaner	Steam, Jenny IIC or equilivant	1
Compressor	Air, 8-120 psi, 9.7 cu. ft. displacement, 60 gal. tank, heavy duty, with oil and water extractor	1
Grinder	Pedestal, 10", heavy duty, 1 hp	1
Hoist	Chain, 2 ton capacity	3
Jointer	6"-8", heavy duty, 1 1/2 hp	1
Monorail	6 ton capacity	1
Planer	16", heavy duty, 5 hp	1
Press	Drill, metal working, 20", heavy duty, 1 hp	1
Press	Drill, wood working, 15", heavy duty 1/2 hp	1
Press	Hydraulic, 50 ton capacity, with safety valve and accessories	1
Saw	Radial arm, 12", heavy duty, 3 hp	1
Saw	Tilting arbor, 12"-14", heavy duty, 3 hp	1
Welder	Arc, 220 v., 20% duty cycle	4
Welder	Oxyacetylene, medium duty	1

II. MECHANICS TOOLS AND SUPPLIES

Woodwork and Carpentry

Tools in this section are for a small-working group, three to five students, and are to be placed in a woodworking cabinet, one cabinet for every three or four students is desirable.

ITEM	DESCRIPTION--------SIZE	NUMBER
Brace	Ratchet, 10" swing	1
Bits	Auger, 1/4"-1" by eights	Set
Bit	Countersink, rosehead - 3/4" x 5"	1
Chisels	Wood, heavy duty, 1/4"-1" by 1/4's	Set
Drawknife	10" blade	1
Hammer	Bell faced, 16 ounces	1
Bar	Wrecking, gooseneck, 18"	1
Plane	Smoothing, 10"	1
Plane	Block, 6"	1
Saw	Hand, crosscut, 26" (8 or 10 points)	1
Saw	Coping, 6 1/2" blade	1
Saw	Keyhole (10 points)	1
Square	Framing 16" x 24"	1
Square	Sliding T-bevel 10"	1
Square	Combination, 12"	1
Screwdrivers	Set of bits, 1/4", 5/16", 3/8"	Set
Screwdrivers	Set of shockproof, 6", 8", 10"	Set
Screwdrivers	Phillips, 6', 8', 10'	Set
Files	Mill files, 6", 8", 10"	Set
Files	Wood rasp, 12"	1
Scraper	Wood, 3" blade	1
Oilstones	Combination, 6" x 2"	1
Mallet	Carpenter's, 16 ounces	1
Knife	Putty	1

Woodwork and Carpentry

Tools in this section should be placed in the central or general tool room.

Bits	Electrician's 1/4", 1/2", 3/4"	Set
Bits	Expansion, 7/8"-3"	Set
Bit	Extension, 15"	1
Clamps	Adjustable bar, 3'-8'	2
Clamps	"C" Clamps, 5" and 10"	2
Hammers	Ripping, 20 ounces	2
Plane	Jack, 15"	2
Saws	Miter saw, 10 points	1

ITEM	DESCRIPTION-----SIZE	NUMBER
Saw sets	(For circular saws)	2
Squares	Try and mitre, 8"	2
Tapes	Return tape, 12'	2
Rules	Extension rule, 6'	2
Tape	Steel tape, 100'	2
Bob	Plumb bob, 12 ounces	4
Levels	Carpenters level (18" and 24")	1
Chalkline	Self chalking, 50'	2
Divider	Wing, 10"	1
Calipers	One each inside and outside, 6"	2
Files	Bastard, flat (2 each of 8" and 10")	4
Files	Bastard, half round, 8" and 10"	2
Files	Bastard, round, 8" and 10"	2
Files	Slim taper, 6"	2
Files	File handles, assorted sizes	24
Miscellaneous Woodworking Tools		
Paint brushes (medium)	(One each of 2", 3", 4")	3
Glass cutter		2
Wire brushes	7 1/4" x 2 7/8"	2
Vises	Woodworking 4" x 10" jaws, open 12"	3
Metal Work		
Hot and Cold:		
Anvil	Steel - 100 pounds	1
Chisels	Cold, 1/4", 3/8", 1/2", 5/8", 3/4", 1"	6
Punches	Center punch 1/2" x 6"	3
Punches	Machine punch 5/8" x 7"	2
Punches	Line-up punch 1/4" x 5/8" x 12"	2
Hammers	Ball peen (one each of 12, 20, and 24 ounces)	set
Hammer	Blacksmith, 40 ounces	1
Hammer	Sledge hammer, 10 pounds	1
Clippers	Bolt clipper, one large and one small	2

ITEM	DESCRIPTION--------SIZE	NUMBER
Hardie	Blacksmith's 1" (fit anvil)	1
Vises	Machinist Vise, swivel base, 5"	2
Tongs	Blacksmith's straight lip 24"	Set
Tongs	Blacksmith's capacity 1 1/2"	Set
Taps and dies	Screw plate, NC and NF, 1/4" to 1" by 16ths	Set
Screw extractors	Nos. 1, 2, 3, 4, 5, 6	Set
Forge	Gas fired with safety valve	1
Welding Equipment		
Grinder	General purpose bench, 1/4 hp motor	1
Grinder	Wet grinder bench model, 8" wheel, 1/4 hp motor	1
Grinder	Sickle grinder, 1/4 hp motor	1
Hammers	Chipping hammers	4
Brushes	10" handle	6
Gloves	Leather	6
Goggles	Chipping and grinding goggles, cup type	6-10
Goggles	Welding goggles, cup type	1*
Helmets	Welding helmets	1*
Torch	Carbon arc	1
Curtain	Welding curtain for welding area	1
Sheet Metal		
Torch	Propane torch, tips and tank	1
Mallets	Tinner's mallet 2 1/2" x 6"	2
Snips	Tinner's snips, straight and curved	2
Soldering iron	Electric, removable tips, 300 watt	1
Rivet kit	Includes tools and rivets	1
Hammer	Riveting hammer, 12 ounces	1
Seamer	Handy seamer, 3 1/2" blade	1
Groover	Hand groover, 3/8"	1

*One for each student

Plumbing

ITEM	DESCRIPTION----------SIZE	NUMBER
Pipe dies	1" to 2"	Set
Pipe dies	Ratchet type 1/4"-1"	Set
Cutter	Pipe, 1/4"-1 1/4"	1
Cutter	Copper tubing, 3/16"-1 1/8"	1
Flaring tools	Copper tubing 3/8"-1/2"	Set
Reamer	Burring bit brace	1
Wrenches	Pipe wrench, 18"	2
Wrench	Pipe wrench, 12"	1
Vise	Pipe, 1/8"-2"	1

Farm Electrification

Outlets and switches	(For electric panel board)	
Pliers	Electrician, side cutting, 7"	3
Screwdrivers	Electrician, 3"	2
Screwdrivers	Electrician, 6"	2
Light	Test light	1
Cable ripper	For cables up to 1/2"	1
Wire strippers	For No. 10 to No. 18 wire	2

Concrete and Masonry

Edger	Concrete sidewalk	1
Groover	Concrete sidewalk	1
Jointer	Concrete sidewalk	1
Level	Mason's level, 48", aluminum	1
Mason's line	Nylon, 100'	1
Shovels	Square point short handle	2
Trowel	Brick, 11"	1
Trowel	Pointing trowel, 5"	1
Trowel	Cementer's trowel, 11"	1

Farm Tractors, Engines and Machinery

Tools in this section are suggested for a small-working group, three to five students, and are to be placed in a cabinet for tractor and machinery repair. One cabinet for every three or four students is desirable.

Hammer	Ball peen, 16-20 ounces	1
Punches	Center punches	Set
Chisels	5/16"-1 1/2"	Set

ITEM	DESCRIPTION-------SIZE	NUMBER
Gauges	Thickness gauges, .003"-.015"	Set
Pliers	One each: needle nose, diagonal Channel lock and vise-grip	Assort.
Screwdrivers	Machines, 6", 8", 12"	Set
Wrenches	Socket and box-end combination 1/4", 3/8", 1/2"	Set
Wrenches	Allen, (hex-head)	Set
Wrenches	Spark plug	Set

Farm Tractors, Engines and Machinery

Tools in this section should be placed in a general (central) tool room or cabinet.

Trolley	Trolley for I-beam, 2 tons	2
Jack	Hydraulic, 3 tons	1
Jack stands	Two tons	2 pr.
Cans	Five gallon for kerosene	2
Cans	One gallon for gasoline	2
Can	With top for water, 15-25 gal.	1
Cans	Oilers, 1/3-1/2 pint	4
Creeper	(For getting under machines)	1
Grease guns	Pressure, lever type, 16 ounces	2
Gauge	Compression, Snap-On	1
Gauges	Vacuum, Snap-On	1
Gauges	Spark plug, wire type	2 sets
Light	Timing light	1
Charger	Battery charger	1
Cable	Jumper cable	1
Pliers	Combination, 6"	4
Screwdrivers	Offset	2
Service light	Heavy cord 25', bulb shield	1
Tire gauge	Heavy duty	1
Puller set	Gear and bearing puller, 3 sets of jaws	1
Wrench	Torque, 1/2", 0-150 ft. lbs.	1
Wrenches	Ignition	Set
Wrenches	Flexible socket	Set
Wrenches	Deep socket	Set
Wrenches	Drive socket - 3/4"	Set

ITEM	DESCRIPTION--------SIZE	NUMBER
Wrenches	Impact, electric	1
Punches	Gasket punches	Set
Pick-up	Pick-up tool, magnetic	1
Compressor	Ring compressor	1
Tester	Battery tester	1
Hydromatic		1
Block	Repair block, mower repair, chain detacher, etc.	1
Small Gasoline Engines		
Wrenches	Open end, 5/16" to 1" by 16ths	Set
Wrenches	Box end, 5/16" to 1", by 16ths	Set
Screwdrivers	Standard, 4"-6"-8"	1 ea.
Screwdrivers	Phillips, 4"-6"	1 ea.
Screwdrivers	Offset, 4"-6"	1 ea.
Chisel	Cold, flat and cape	Set
Punches	Assorted	Set
Pliers	Needle nose	4
Pliers	Combination	4
Pliers	Water pump	2
Pliers	Vise grip	2
Hammer	Ball peen, 16 ounce	3
Wrench	Adjustable, 8"	1
Wrench	Adjustable, 10"	1
Hammer	Plastic	3
Gauge	Feeler, 26 blades	2
Gauge	Spark plug, wire	2
Tool	Ignition tool set	1
Bar	Pry, 18"	1
Wrench	Set 3/8" drive socket wrenches with 13/16" deep socket	set
Wrench	Pipe 18"	1
Oiler	Hand	1
File	Flat, 8"	3
Brush	Wire, hand	3
Knife	Putty	3
Screwdriver	Hex	Set
Wrench	Torque, 3/8" drive, 0-600 in. lbs.	1
Light	Trouble	2
Power Tools and Large Equipment		
Drill	Portable, electric, 1/4"	1

ITEM	DESCRIPTION--------SIZE	NUMBER
Drill	Portable, electric, 3/4"	1
Grinder	Portable grinder, 1" x 6" with attachment for drill bits and chisels	1
Dresser	Wheel dresser	1
Drill bits	High speed, 1/16" - 1/2" by 64ths, 1/2" - 1" by 8ths	Set
Drill bits	Masonry drills, 1/4" - 3/4" by 16ths	Set
Saw	Portable, heavy duty, 7" blade	1

Miscellaneous Tools and Equipment

Diggers	Post-hole, 9" blade	2
Stretcher	Wire stretcher	1
Fire blanket	(Safety item in shop)	1
Fire extinguisher	CO_2, 10 lb. size	1
First aid center	Assortment of needs	1
Chain detacher		1
Step ladder	2 sections, 30'	1
Spray gun	Paint gun, high production	1
Level	Bostrum level, utility	1
Lettering set	(For marking tools) 1/8" letters	1
Engines, used	Car and tractor (cut-away)	1*
Engines, used	Small gas, 2 and 4 cycles	1*
Motors, used	Electric motors, different types	1*

III. CONSUMABLE SUPPLIES

This list contains some of the consumable supplies that should be available in the farm mechanics shops.

Arc Welding

Steel electrodes	1/8" and 5/32"	100 lbs.
Cast electrodes	1/8"	10 lbs.
Carbon rods	3/16" and 3/8" x 6" cored and copper coated	12
Steel metal	Scrap steel 1/4" thick, 4" wide, 12' long	500 lbs.

*One per student

ITEM	DESCRIPTION------SIZE	NUMBER
Oxy-acetylene Welding		
Steel rods	Mild steel oxy-acetylene filler rods, 1/16", 1/8", 3/32"	40 lbs.
Cast rods	Cast iron oxy-acetylene filler rods 1/8"	5 lbs.
Bronze rods	Bronze oxy-acetylene filler rods, 1/16", 1'8", 3/32"	15 lbs.
Steel bar	Mild steel bar 1/8" x 1"	100'
Rods	Assortment for hardfacing	Assort.
Flux	Flux for cast iron and brazing	5 lbs.
Flints	Igniter flints	12
Sheet Metal		
Metal Sheets	Galvanized steel sheets, 4' x 4' 28 gauge	4
Metal sheets	Stainless steel 1' x 4', 28 gauge	4
Screws	Sheet metal, 1/2" No. 4	5 lbs.
Solder	Solder, bar 50-50	2 lbs.
Solder	Solder, spool, acid and rosin core	2 lbs.
Plumbing		
Pipe	Galvanized pipe, 1/2" and 3/4"	100'
Pipe	Copper pipe, 3/8" and 1/2"	40'
Fittings	Coupling, elbow, tee, union, nipple	Assort.
Electrical		
Tape	Plastic, friction and rubber, several rolls of each	Assort.
Bulbs	Light bulbs, 25 watt	8
Connectors	Male and female (for plugging in)	24
Wire	Grounded wire, various sizes	100"
Wire	Extension cord	Assort.
Fixtures	Outlets, switches	Assort.
Fuses	Screw type, assorted sizes	12

Machinery

ITEM	DESCRIPTION------SIZE	NUMBER
Cleaning fluid	Kerosene and gasoline	25 gal.
Rags	Cleaning rags	100 lbs.
Grease	Hi-pressure	50 lbs.
Oil	S. A. E. 20-30	10 gal.
Oil	Penetrating	1 gal.
Oil	Household - light	1 gal.
Compound	Valve grinding compounds	1 lb.
Cotter keys	3/4" - 2"	Assort.
Bolts	Machine bolts	Assort.
Bolts	Machine screw bolts and nuts	Assort.
Nuts	NC and NF	Assort.
Washers	Lock washers	Assort.

Woodwork

Nails	Common, various sizes	60 lbs.
Nails	Finishing, various sizes	40 lbs.
Brads	Assortment of various sizes	5 lbs.
Bolts	Carriage bolts	Assort.
Bolts	Lag bolts (screw)	Assort.
Bolts	Stove	Assort.
Nuts	Square	Assort.
Hinges	Various kinds and sizes	Assort.
Washers	Plain, various sizes	Assort.
Fasteners	Corrugated, various sizes	Assort.
Screws	Various sizes and kinds	Assort.
Paint remover	Paint and varnish remover	1 gal.
Turpentine	Turpentine or thinner	1 gal.
Paper	Sandpaper, various sizes	Assort.
Brushes	Paint brushes, various sizes	Assort.
Glue	Casein powder or casein base liquid	4 lbs.

Miscellaneous

Blades	Hack saw blades	12
Blades	Extras for power saws	Sev.
Blades	For horizontal power bandsaw metal cutting	6
Handles	Extra handles for various tools	
Cloth	Emery cloth	
Wool	Steel wool	
Steel	Mild steel, flats and rounds, various sizes	Assort.
Putty	(For glazing)	5 lbs.

IV. Explanatory notes

1. Portable welding screens to shield welding area from rest of shop. These can be removed and stored to increase working space when welding is not being taught.

2. An exhaust system of movable, individual hoods should be used to remove smoke and fumes. This system can be extended and adapted to remove the exhaust fumes from the internal combustion engines used in these classes.

3. Compressed air should be available throughout the shop and work areas.
   (a) 1 quick-connect air outlet every 20' around the shop
   (b) 1 quick-connect air outlet in paved area

4. Water connections:
   (a) 1 hose connection inside shop near overhead door
   (b) 2 hose connections in concrete paved area for washing and steam cleaning operations

LABORATORY STORAGE

I. Tool room

1. Wall panels, bins or cabinets for storage of special tools, tool sets, portable tools and other equipment

2. Tool room should be secured

II. Supplies storage

1. Can be included in the tool room if necessary

2. Bins and/or locked cabinets for consumable supplies and other specialized items

III. Overhead storage

1. Located above office, tool room, wash room and classroom areas if needed

2. Wall mounted and/or free standing racks for storage of lumber, steel and other large supply items

3. A ladder or stair way and a guard rail must be provided

4. In some instances the air compressor can be located in this area, do not locate over classroom because of noise problems

OUTSIDE PAVED AREA

1. The area outside of overhead door where washing and steam cleaning operations are carried out must be paved with concrete and supplied with adequate drains to carry off waste water. Asphalt must not be used in this area due to the fact that the asphalt will be broken up by the effects of grease, oil and steam. The remainder of the area can be paved with asphalt or concrete as desired.

2. Entire area should be fenced with 8' high chain link fence with one 16' wide gate and other gates as needed. Provisions should be made to secure the area during out of school hours.

3. Loading ramp constructed of concrete, 4' high, 14' wide and at least a 4' x 14' level area at top, with a down slope of 4" per foot, length of slope will be determined by land topography where the ramp is constructed.

4. Open front shed opens into this paved area.

OUTSIDE COVERED SHED

1. Should be of pole construction with metal roof, back and ends

2. Have a concrete floor

3. Used for storage of large equipment and machinery needed for class work

LAND LABORATORY

1. An area of 1-10 acres should be provided adjacent to the facility for use in class work. Can be used for demonstrations, test plots, for practical student exercises and other ways as necessary.

2. Size should be determined on present and projected future needs of the agricultural programs.

ELECTRICAL REQUIREMENTS

The section will outline in general terms the electrical requirements of the various areas of the facility.

1. Classroom
    (a) 1 - 110 v., 20 amps. polarized duplex outlet every 10' around classroom
2. Teacher Office
    (a) 2 - 110 v., 20 amps. polarized duplex outlets

3. Classroom Storage
    (a) 2 - 110 v., 20 amps. polarized duplex outlets

4. Library
    (a) 2 - 110 v., 20 amps. polarized duplex outlets

5. Mechanics Laboratory
    (a) 1 - 110 v., 20 amps. polarized duplex outlet every 10' around laboratory area
    (b) 1 - 220 v., outlet every 10' around laboratory area
    (c) 6 - 220 v., welder outlets, 4 in welding area, 2 in other shop areas
    (d) 2 - Buss bars, 10' in from side walls running the length of the shop to allow for flexibility in locating stationary equipment and to provide adequate electrical power in all areas of the mechanics laboratory

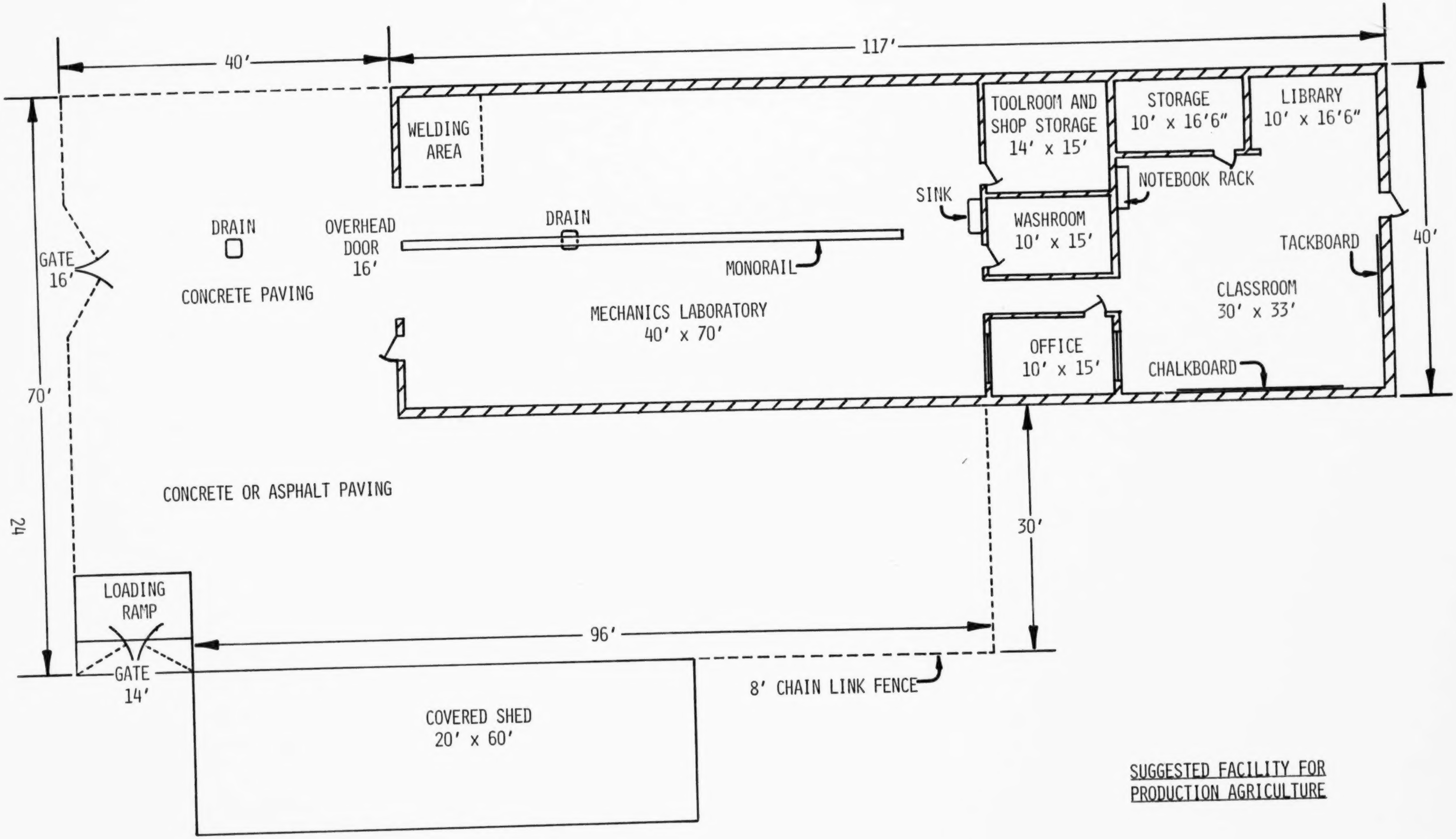
6. Tool Room
    (a) 1 - 110 v., 20 amps. polarized duplex outlet

7. Outside Paved Area
    (a) 2 - 110 v., 20 amps. weatherproof polarized duplex outlets outlets
    (b) 1 - 220 v., weatherproof welder outlet

8. Covered Shed
    (a) 4 - 110 v., 20 amps. weatherproof polarized duplex outlets
    (b) 1 - 220 v., weatherproof welder outlet

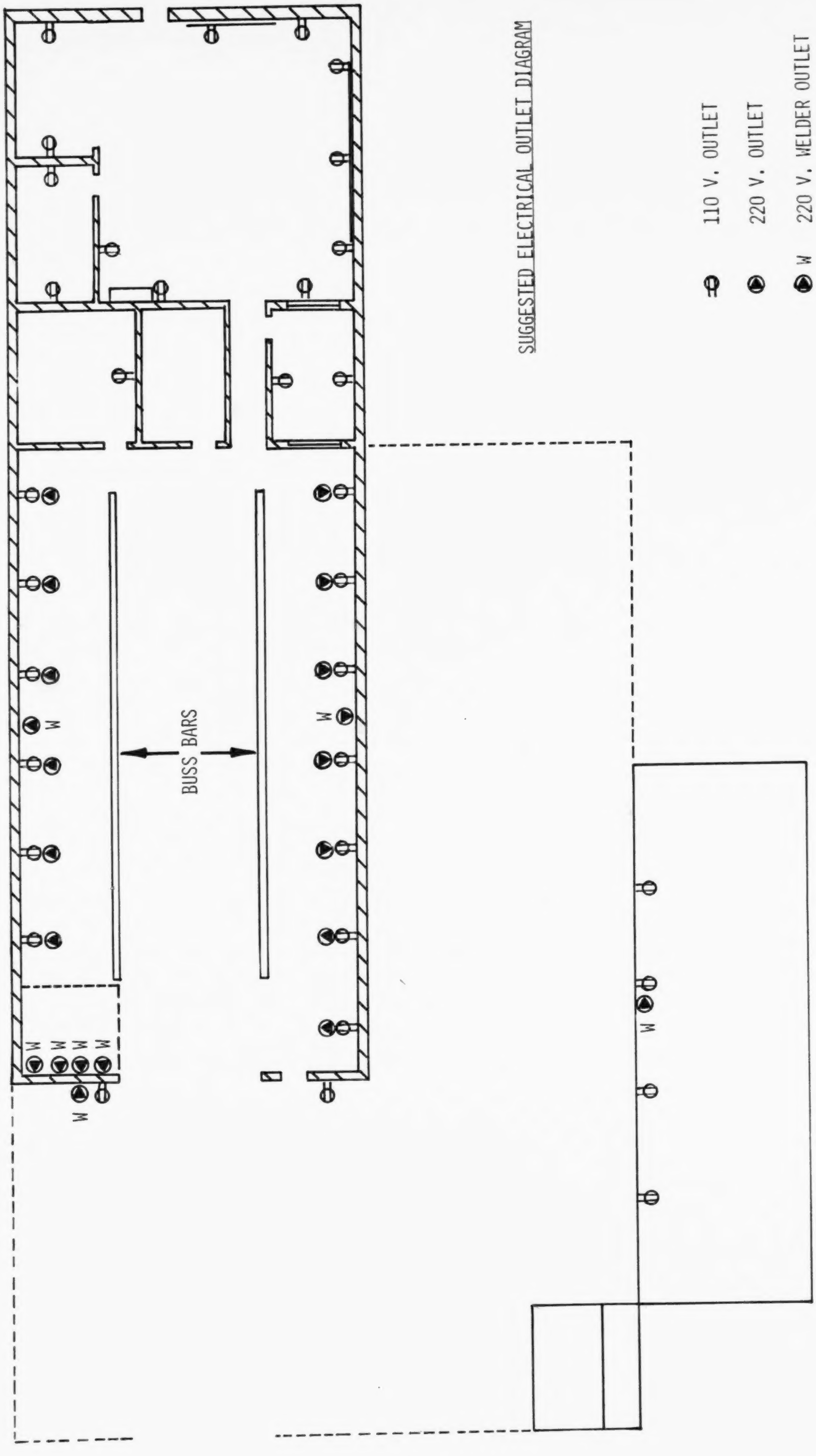
SUGGESTED PLANS

The last part of this section consists of suggested floor plans for the production agriculture facility. These plans include all areas previously outlined and contain details of certain sections for clarity. There is an electrical diagram consisting of the recommended numbers of outlets, size and location. Number, size and type of lighting will be determined by state specifications and will conform to the type selected for use in the remainder of the school building.


40′
117′
TOOLROOM AND SHOP STORAGE 14′ x 15′
STORAGE 10′ x 16′6″
LIBRARY 10′ x 16′6″
WELDING AREA
NOTEBOOK RACK
SINK
WASHROOM 10′ x 15′
TACKBOARD
40′
GATE 16′
DRAIN
OVERHEAD DOOR 16′
DRAIN
MONORAIL
CONCRETE PAVING
CLASSROOM 30′ x 33′
MECHANICS LABORATORY 40′ x 70′
OFFICE 10′ x 15′
CHALKBOARD
70′
CONCRETE OR ASPHALT PAVING
30′
LOADING RAMP
96′
GATE 14′
8′ CHAIN LINK FENCE
COVERED SHED 20′ x 60′

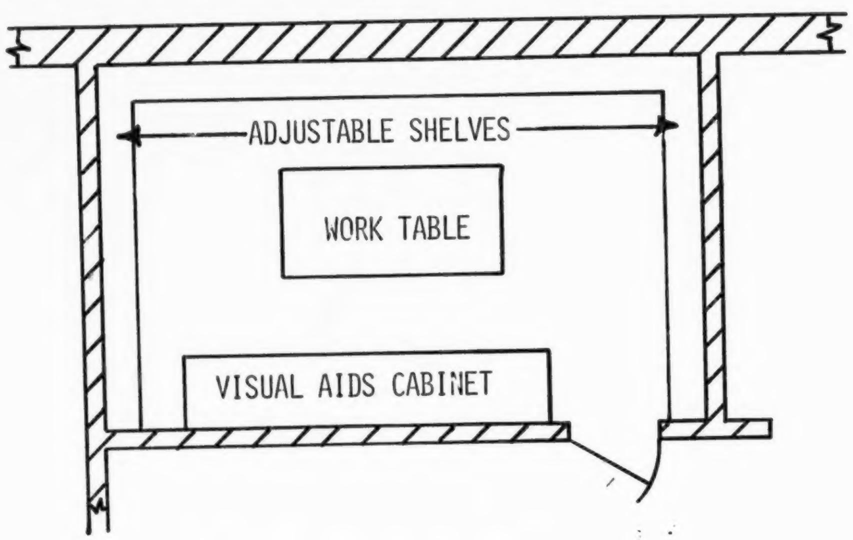
SUGGESTED FACILITY FOR
PRODUCTION AGRICULTURE

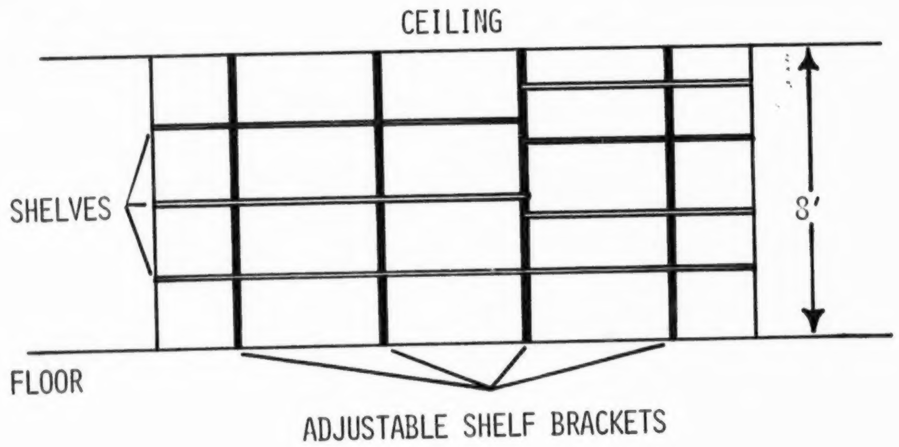
SUGGESTED ELECTRICAL OUTLET DIAGRAM


BUSS BARS
W
110 V. OUTLET
220 V. OUTLET
220 V. WELDER OUTLET

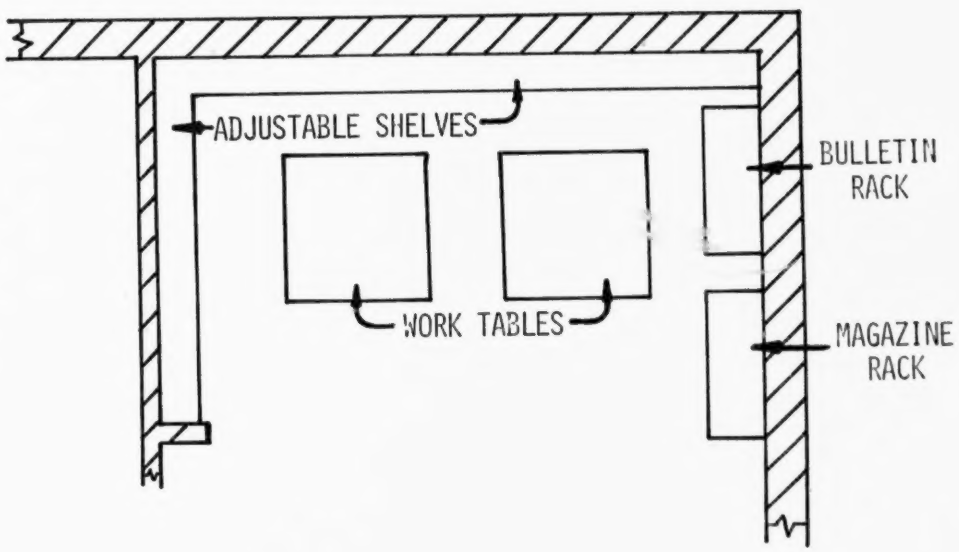
SUGGESTED ARRANGEMENT FOR CLASSROOM STORAGE AND LIBRARY

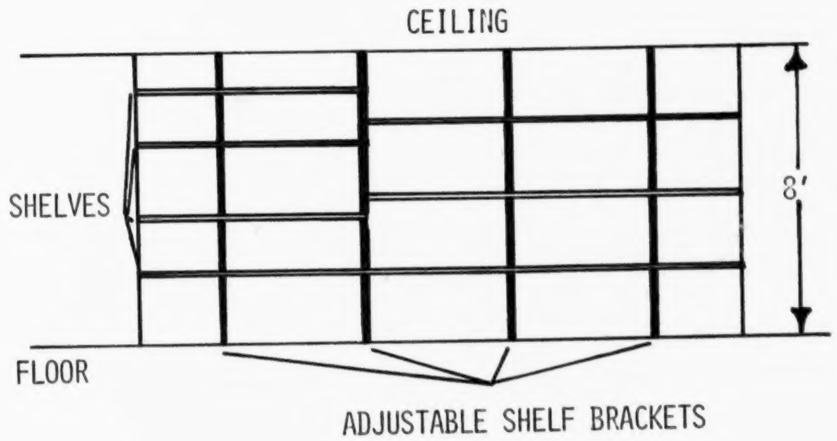
STORAGE


ADJUSTABLE SHELVES
WORK TABLE
VISUAL AIDS CABINET

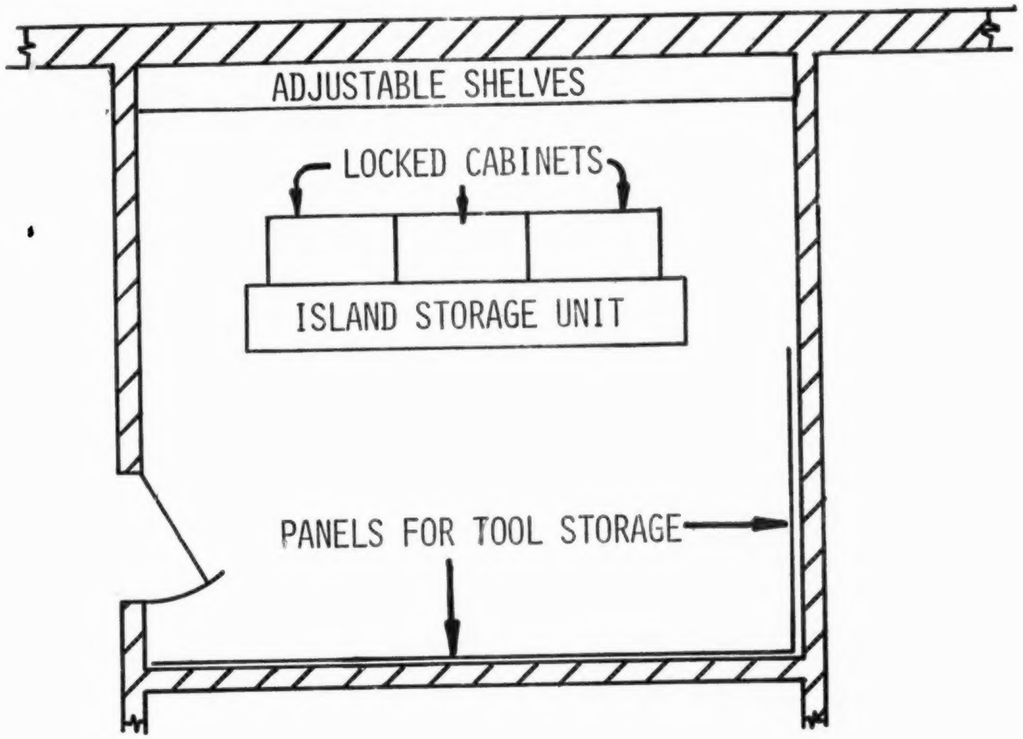

CEILING
SHELVES
8′
FLOOR
ADJUSTABLE SHELF BRACKETS

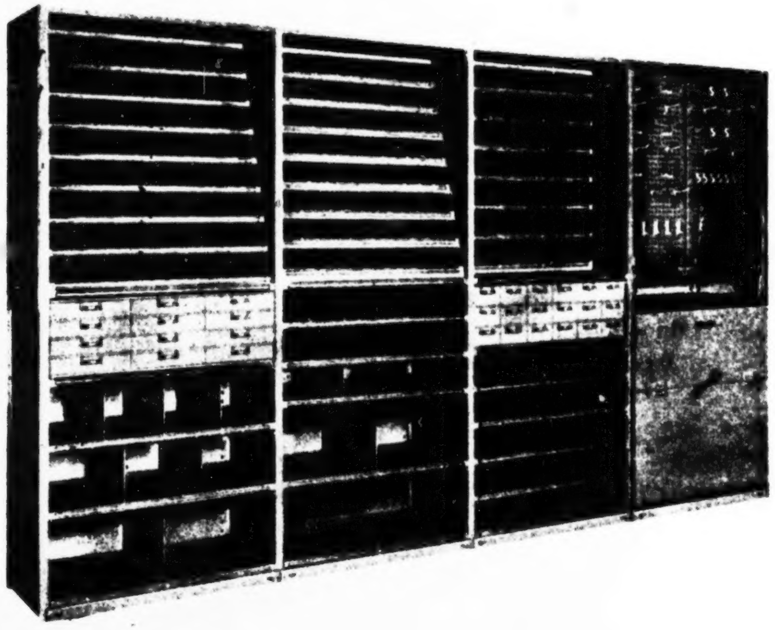
LIBRARY


ADJUSTABLE SHELVES
WORK TABLES
BULLETIN RACK
MAGAZINE RACK

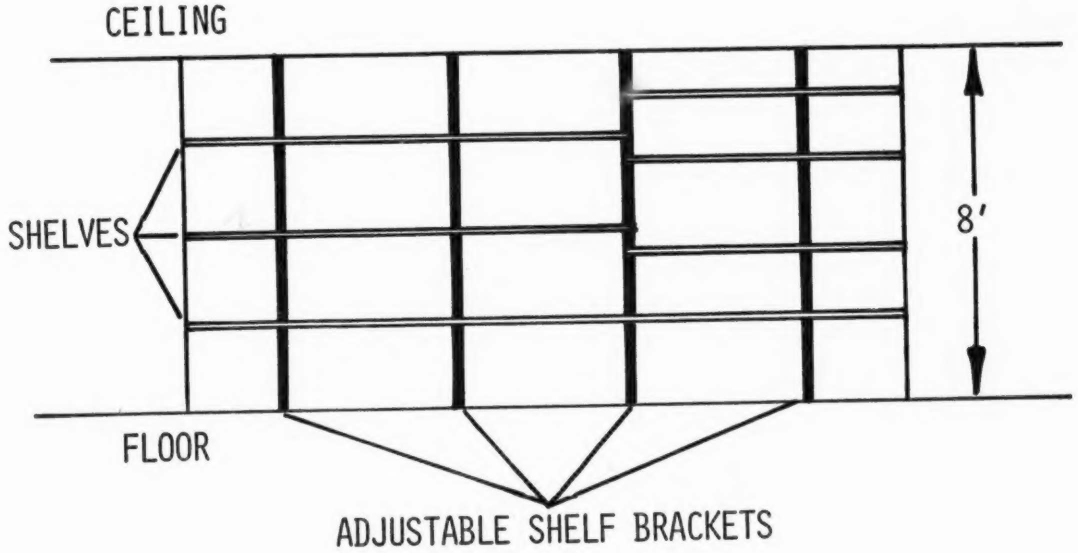

CEILING
SHELVES
8′
FLOOR
ADJUSTABLE SHELF BRACKETS

SUGGESTED ARRANGEMENT FOR SHOP STORAGE AND TOOLROOM

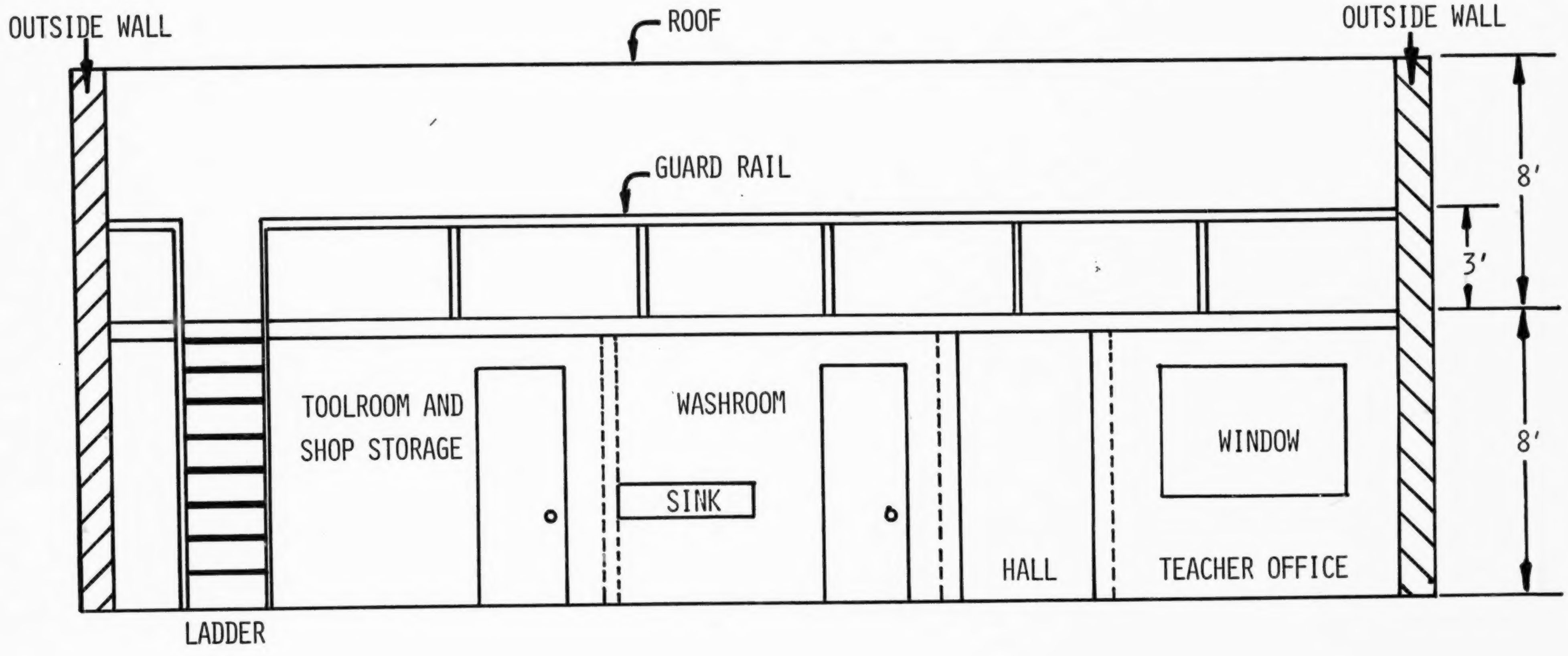

ADJUSTABLE SHELVES
LOCKED CABINETS
ISLAND STORAGE UNIT
PANELS FOR TOOL STORAGE



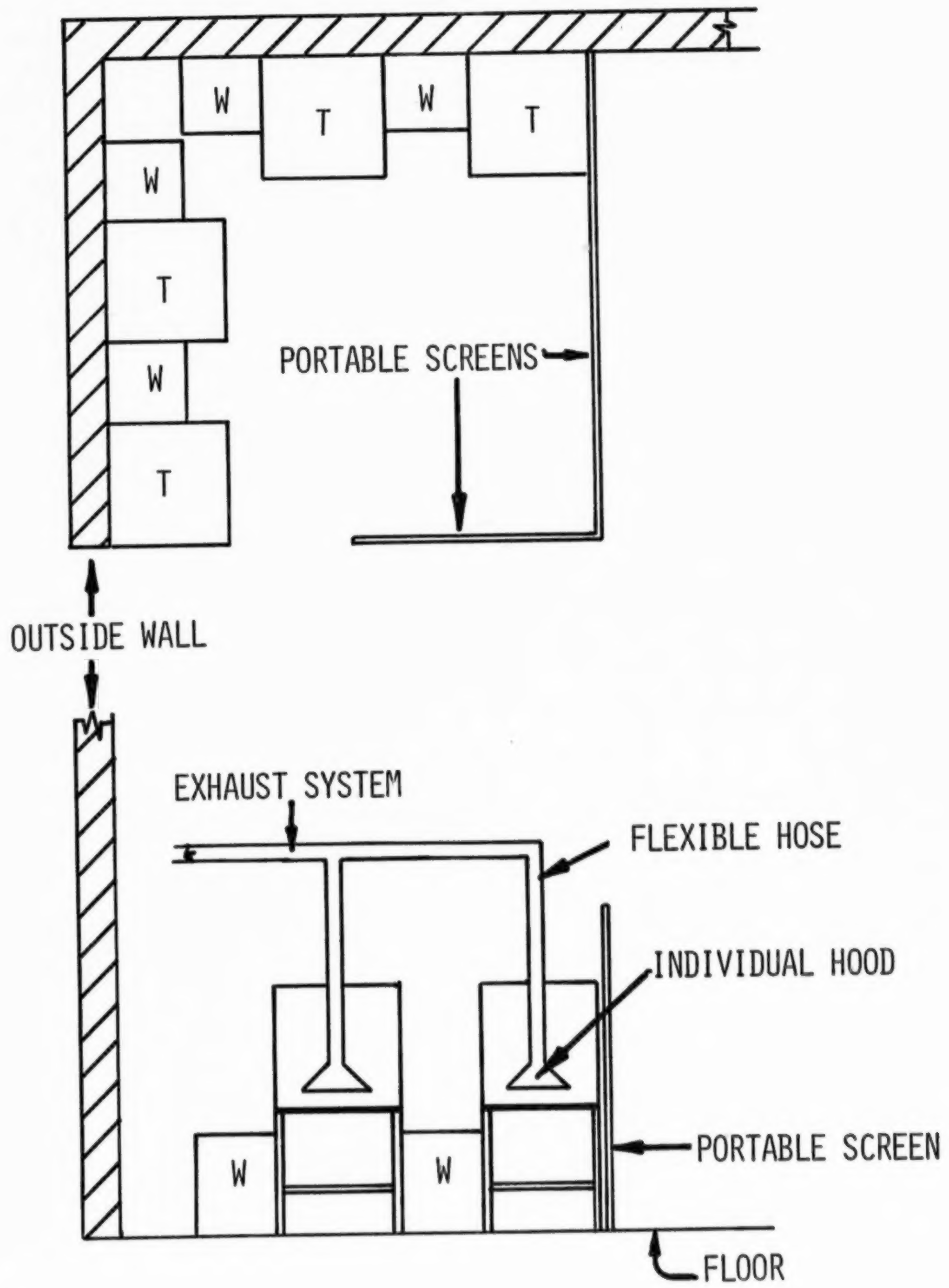
EXAMPLE OF ISLAND TYPE STORAGE UNIT


CEILING
SHELVES
8′
FLOOR
ADJUSTABLE SHELF BRACKETS

SUGGESTED OVERHEAD STORAGE


OUTSIDE WALL
ROOF
OUTSIDE WALL
GUARD RAIL
8'
3'
8'
TOOLROOM AND SHOP STORAGE
WASHROOM
SINK
WINDOW
HALL
TEACHER OFFICE
LADDER

SUGGESTED ARRANGEMENT FOR WELDING AREA


W
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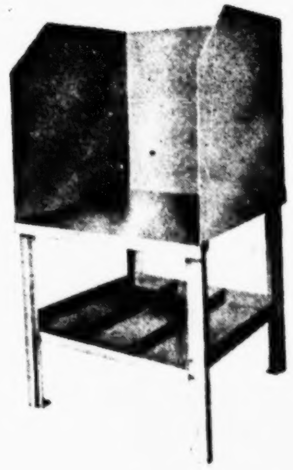
PORTABLE SCREENS
OUTSIDE WALL
EXHAUST SYSTEM
FLEXIBLE HOSE
INDIVIDUAL HOOD
W
W
PORTABLE SCREEN
FLOOR



EXAMPLE OF TYPE OF WELDING TABLE

T - WELDING TABLE

W - ARC WELDER

SECTION 2 - AGRICULTURAL MECHANICS

The agricultural mechanics facility is designed for the situation where it will be the only vocational agricultural education curriculum taught in the school. The facility is based on the circumstance where there is only one teacher, in multiple teacher departments, each teacher should have an individual office and where scheduling requires that each teacher meet a class during the same period, additional classroom facilities must be provided.

SPACE REQUIREMENTS

Facility Section	Recommended Area (Sq. ft.)
Classroom	960-1050
Teacher Office	150- 180
Classroom Storage	150- 180
Library	150- 180
Washroom	100- 150
Mechanics Laboratory	2800-3200
Laboratory Storage	
tool room	150- 180
supplies storage	50- 75
overhead storage	300- 360
Outside Paved Area	5000-5500
Outside Covered Shed	1200-1500
Painting Facilities*	475- 500

The following parts of this section will outline the equipment required for the various areas of the facility, some of the special requirements of these areas and a recommended list of tools and supplies.

CLASSROOM:

I. Equipment

1. Tables and chairs, or arm chairs for projected class size.
2. Laboratory table or desk at front for teacher with sink and water connections.
3. Chalkboard, 3 1/2' x 20' at front, 36" from floor to chalktray.
4. Tackboard, 3 1/2' x 10' at side or rear of classroom near entrance door, 36" from floor to bottom of tackboard.

*Note: The painting facilities in area vocational centers could be a larger facility shared with other vocational services requiring such painting facilities.

5. Projection screen, daylight type, 70" x 70", ceiling mounted or wall mounted, 8' - 10' from floor to top of screen, with bracket to adjust for keystone effect when used with the overhead projector.

6. Each window equipped with shades, twi-nighter venetian blinds or blackout curtains so room can be darkened when using projection equipment.

7. Notebook rack to be of sufficient size to provide storage of all students' notebooks. (One space per student enrolled in the curriculum)

II. Audio-Visual Equipment

1. Projection table
2. Overhead projector with projection table
3. Slide and film strip projector
4. 35 mm camera
5. The following items to be provided if they are not readily available for use from the school visual aids or library department.
    (a) 16 mm movie projector
    (b) Super 8 mm movie projector for film loops
    (c) Opaque projector

III. Tools, Equipment, and Supplies

CLASSROOM

ITEM	DESCRIPTION-----SIZE	NUMBER
Cabinet	Slide and filmstrip storage	1
Aids	Slides, strips, transparencies	Collection
Chart files	For large charts	1
Viewer	For slides and filmstrips	1
Loud speaker	Portable	1
Microscope	Teaching, revolving	1
Scale	Utility, 60 pounds	1
Scale	Hanging, 100-300 pounds	1

TEACHER OFFICE

I. Equipment

1. Office desk, steel, 3 drawers on one side and single drawer and file drawer on other side, with a large center drawer

2. Desk chair with casters, padded seat and back
3. Telephone
4. Adding Machine
5. Typewriter with portable table
6. Two side chairs
7. Bookcase
8. 2-4 drawer steel filing cabinets

II. Teacher Office Supplies

OFFICE

ITEM	DESCRIPTION------SIZE	NUMBER
Punch	Hand-hole punch	1
Guide	Lettering guide	1
Pens	Lettering (marking) pens 1/8" and 1/4"	2

CLASSROOM STORAGE AREA

1. Adjustable shelves on three walls for storage of teaching materials and supplies.
2. Large cabinet for storage of audio-visual equipment and other teaching materials such as charts, graphs, films, etc.
3. Table, approx, 3' x 6' x 30" for set up and testing of visual aids equipment.

LIBRARY

1. Library tables and chairs for students using the library area
2. Adjustable shelves on walls for storage of student reference materials
3. Magazine rack
4. Bulletin storage cabinet or rack

WASHROOM

Commodes, urinals and sinks as needed. The space requirements will vary according to the numbers of students enrolled and the availibility of other sanitary facilities in the school.

MECHANICS LABORATORY

The mechanics laboratory should have one large service door leading to the outside paved area, size 14' high x 16' wide. There should be a small 36" door alongside large service door leading to outside paved area. Direct access from classroom and teacher office is desirable. At least one floor drain should be provided near center of open work space with concrete floor adequately sloped for proper drainage.

The welding area should be shielded from the remainder of the shop and contain adequate ventilation to remove the smoke and fumes created by the welding process.

Over the office, tool room, washroom and if required the classroom, storage should be provided for lumber, metal and other large materials needed for use by the students. Racks, either wall or free standing, should be provided for storage of these materials.

The tool room, office, washroom and classroom should have 8' ceilings, as higher ceilings will result in wasted space and loss of badly needed storage space.

The air compressor should be permanently located and quick-connect outlets located every 20' around the shop on the walls.

A sink for student clean up should be provided in the laboratory area.

Monorails must be provided. Either two single monorails, one down each side of the shop or a U-shaped monorail around the shop.

I. Tools, Equipment and Supplies

Following is a recommended list of some of the necessary tools, equipment and supplies to adequately conduct an occupation program in agricultural mechanics.

For all items listed herein the manufacturers name is indicative of quality and all items should be of equal of better quality regardless of manufacture.

MECHANICS LABORATORY

ITEM	DESCRIPTION------SIZE	NUMBER
Compressor	Air, 60 gal. tank, 3 hp, two stage 12 CFM	1
Welder	Arc, 225 amp, 20% duty cycle	8

ITEM	DESCRIPTION----SIZE	NUMBER
Welder	Acetylene, medium duty, with rubber tired carts	2
Cleaner	Steam, Jenny II car equivalent	1
Saw	Metal cutting bandsaw, 8" capacity	1
Grinder	10", 1 hp, with pedestal and shields	1
Grinder	7" with stand and shields	2
Grinder	Wet valve	1
Press	Drill, 15", variable speed	1
Hoist	Chain, 2 ton	4
Trolley	I-Beam hoist	4
Tester	Spark plug tester and cleaner	1
Press	Hydraulic, 50 ton with tools, safety valve and accessories	1
Washer	Parts, with pump and accessories	1
Crane	Portable hydraulic	2
Dynamoneter	Portable	1
Welder	Spot, 24" with spot gun	1
Benches	Work, 72" x 30" x 32" high	4
Storage	Bin unit, (ledge type) GH-7L-6	1
Cutter	And Bender, sheet metal	1
Gun	Spray paint with cup	1
Drill	1/4" electric portable	1
Drill	1/2" electric portable	1
Charger	Battery, 6 and 12 volts	1
Jacks	2 ton service	3
Sander	Portable 7"	1
Sander	Vibrating	1
Wrench	Air impact, 1/2" drive	1
Wrench	Sockets, impact, 1 set of 6, 1/2" - 13/16"	Set
Vise	Machinist, 4"	3
Vise	Machinist, 6"	1
Tank	Portable, air	1
Tool	Honing, for tractor engines	1
Jack	Floor, 5 ton	1
Stand	Safety, floor, 5 ton	6 pr.
Kit	#41-104 Marquette Gold line engine tune up consists of: 41-117 timing light 6-12 v. 41-100 amp, volt, regulator tester 41-101 dwell, tach tester 41-103 combustion tester 41-105 ignition tester 41-140 mobile floor stand 41-126 current indicator	

ITEM	DESCRIPTION-----SIZE	NUMBER
	41-123 vacuum & fuel pump tester 41-111 high tension tester and/or scope ignition tester	1 kit
Growler	#41-107 Marquette	1
Tester	Compression	1
Light	Timing, #41-107, marquette, 6 and 12 v.	1
Tester	Diesel injector	1
Tester	Hydraulic system	1
Compressor	Piston Ring, 4"	1
Compressor	Piston Ring, 6"	1
Gun	Grease, bucket type	1
Wrench	Set, combination open and box end 3/8" - 2"	1 set
Reamer	Ridge, tractor engine	1
Expander	Piston Ring, for tractor engines	2
Wrench	Adjustable 6"	2
Wrench	Adjustable 8"	2
Wrench	Adjustable 12"	2
Wrench	Adjustable 14"	2
Wrench	Adjustable 16"	2
Wrench	John Deere Fork	1
Wrench	Socket, Thorsen #528 7/8" - 1" (shallow)	1 ea.
Wrench	Socket, Thorsen #530 7/8" - 1" (shallow)	1 ea.
Wrench	Socket, Thorsen #532 7/8" - 1" (shallow)	1 ea.
Wrench	Socket, 1 set, 1/2" - 1" (deep)	1 set
Wrench	Ratchet 3/4" drive	1
Wrench	Pull handle, 3/4" drive	1
Wrench	Chain	1
Wrench	Socket, 3/4" drive, 7/8"	1
Wrench	Socket, 3/4" drive, 15/16"	1
Wrench	Socket, 3/4" drive, 1"	1
Wrench	Socket, 3/4" drive 1 1/16"	1
Wrench	Socket, 3/4" drive, 1 1/8"	1
Wrench	Socket, 3/4" drive, 1 3/16"	1
Wrench	Socket, 3/4" drive, 1 1/4"	1
Wrench	Socket, 3/4" drive, 1 5/16"	1
Wrench	Socket, 3/4" drive, 1 3/8"	1
Wrench	Socket, 3/4" drive, 1 7/16"	1
Wrench	Socket, 3/4" drive, 1 1/2"	1
Wrench	Socket, 3/4" drive, 1 9/16"	1
Wrench	Socket, 3/4" drive, 1 5/8"	1

ITEM	DESCRIPTION-----SIZE	NUMBER
Wrench	Socket, 3/4" drive, 1 11/16"	1
Wrench	Socket, 3/4" drive, 1 3/4"	1
Wrench	Socket, 3/4" drive 1 13/16"	1
Wrench	Socket, 3/4" drive, 1 7/8"	1
Wrench	Socket, 3/4" drive, 2"	1
Wrench	Allen, 1 large set	1 set
Wrench	Pipe, 8"	1
Wrench	Pipe, 12"	1
Wrench	Pipe, 18"	1
Wrench	Pipe, 24"	1
Wrench	Obstruction, 9/16" x 5/8" #1730	1
Gun	Soldering, Wellers #D550	1
Gun	Soldering, Wellers #D440	1
Copper	Soldering, 1 pound	2
Handle	Soldering copper	2
Torch	Benz-O-Matic, TX-25	1 kit
Drill	Bits, Hanson S-29 (to 1/2")	2 sets
Drill	Bit, 5/8"	2
Drill	Bit, 11/16"	2
Drill	Bit, 3/4"	2
Drill	Bit, 13/16"	2
Drill	Bit, 7/8"	2
Drill	Bit, 15/16"	2
Drill	Bit, 1"	2
Hammer	Sledge, true temper #815	1
Wrench	Lug, 4-way	2
Helmet	Welding, sellstrom #233	15
Goggles	Acetylene welding	15
Goggles	Clear	15
Compressor	Valve spring, ko#380	1
Bushing	Bushing remover set - Rimac #25 (c-type)	1 set
Micrometer	Inside 0 - 8"	1
Micrometer	Outside 0 - 1"	1
Micrometer	Outside 1 - 2"	1
Micrometer	Outside 2 - 3"	1
Micrometer	Outside 3 - 4"	1
Puller	Gear, T - type	1
Puller	Gear, 3 jaw 0-10"	1
Puller	Pulley, wrap around type	1
Puller	Bearing, cup puller	1
Puller	Split collar	1
Puller	Push puller	1
Puller	Gear and wheel, #1002A	1

ITEM	DESCRIPTION------SIZE	NUMBER
Plier	Brake spring Utica 525	1
Plier	Needle nose, Utica 777	4
Plier	Combination, 8", Utica 8	2
Plier	Combination, 6", Utica 6	2
Plier	Combination, 10", Utica 10	2
Plier	Vise grip 7-R	2
Plier	Vise grip 10-R	2
Plier	Battery, Utica 524	1
Plier	Side cutting, 8"	2
Plier	Side cutting, 7"	2
Plier	Lock ring, large	1
Plier	Lock ring, small	1
Hammer	Ball peen, 24 ounce	1
Hammer	Ball peen, 32 ounce	1
Hammer	Chipping, arc welding	12
Hammer	Pick and Finish, 13 ounces	1
Hammer	Chisel, 16 ounce	1
Hammer	Claw, 16 ounce	2
Hammer	Sliding, inside, P & C 4056A	1
Hammer	Sliding, outside, P & C 4056	1
Mallet	Rubber	2
Anvil	150 lbs.	2
Tongs	Straight lip, 10-18"	12 pr.
Screwdriver	3", Stanley 1006	2
Screwdriver	4", Stanley 1006	2
Screwdriver	8", Stanley 1006	2
Screwdriver	10", Stanley 1006	2
Screwdriver	Phillips, Stanley 2751	2
Screwdriver	Phillips, Stanley 2752	2
Screwdriver	Phillips, Stanley 2753	2
Screwdriver	Phillips, Stanley 2754	2
Screwdriver	Hold-eze, 1 set	1 set
Kit	Briggs & Stratton #291661	2 kits
Grinder	Valve, Zim #311	2
Expander	Piston ring, Zim #203	2
Wrench	Torque, S-58	1
Lathe	Valve refacing, Zim #525	1
Hone	Cylinder, small engine, #3950	1
Compressor	Valve spring, Zim #131	1
Reamer	Ridge, Zim #287	1
Hydrometer	Battery, 518-T	1
Oiler	Hydraulic, Pump, #228	2
Gun	Grease, K.P.	1
Lamp	Trouble, 625-50 H. O.	3
Cord	Extension, 6250-50', HD #14/3 wire	2

ITEM	DESCRIPTION----SIZE	NUMBER
Light	Trouble, reel type	2
Gauge	Thickness, 26 blade	2
Gauge	Spark plug, wire	2
Gauge	Tractor tire, #9350	1
Calipers	Outside, 0-6"	1
Calipers	Inside, 0-6"	1
Indicator	Speed, Starrett 107	1
Gauge	Screw pitch, #40 Starrett	1
Saw	Hack	5
Saw	Keyhole Hack, #237	1
Gloves	Welding, #1030	12
Saw	Crosscut, 26", 8 points, #D23	1
Cutter	Bolt, #290 MNE	1
Cutter	Pipe, #2A, 1/8" - 2"	1
Cutter	Tubing	1
Clamp	Jorgenson Hold Down #1623-S	2
Clamp	C". 12"	6
Clamp	C", 6"	6
Clamp	Bar, 6'	4
Cover	Dust, vinyl #21099	1
Strap	Battery	2
Knife	Putty	1
Adapter	Tractor tire, water	1
Pick up	Magnetic stick type	1
Pan	Drain, (Floor type) #450	1
Creeper	#271	3
Cleaner	Piston ring groove #0C25	1
Stone	Oil, JB8 combination	2
Brushes	Parts cleaning, adjusto	2
Tap & die	#3312 greenfield tap die set combination NC & NF 1/2" through 1"	1 set
Extractor	Screw, 1, 2, 3, 4, 5, 6, #197	4 sets
Dies	Pipe, #72 - 1 Reed pipe dies with ratchet die stock and 1/8", 1/4", 3/8", 1/2", 3/4", 1", 1/4" dies	1 set
Reamer	Burring, 1/2" to 4"	1
Reamer	Wrist pin bushing	1
Filler	Battery, #401	1
Cable	Battery booster, Marquette BC 4036	1
Funnel	Lock-on tractor #545-26	1
Funnel	One quart, #25	1
Can	Gas, 5 gallon	2
Can	Justrite oiley waste, 10 gallon, #9-300	1
Measurer	2 qt. oil, #102	1

ITEM	DESCRIPTION-----SIZE	NUMBER
Filler	Radiator, #501	1
Tester	Anti-freeze, #808	1
Removing	Sleeve	1 set
Tool	Clutch aligning	1
Tool	Tire	1 set
Tool	Flaring	1
Pump	Gear oil	1
Foot	Crows	1
Punches	Complete set	1 set
Nipple	#83576, 1/2"	1
Coupler	Speed, #210	1
Connectors	#A2609	4
Gun	Air, #109	1
Chuck	Air, Male thread	1
Square	Combination, R10	2
Square	T-Bevel, #18TB	1
Dolly	General purpose, #201	1
Dolly	Heavy wedge, 41 oz. (Drop forged) #207	1
Snips	Tin, combination, #V19	1
Snips	Tin, combination, #V10	1

Mechanics tool sets, 15 required (1 per student)

Wrench	Open end, proto set, #3000 H, 1/4"-1 1/8"	1 set
Wrench	Box end, proto set #1100 M, 5/16" - 1 1/8"	1 set
Wrench	Ignition, proto set #3200 D	1 set
Wrench	Allen, set #18	1 set
Wrench	Socket, 1/2" drive, 7/16" - 1" proto set #5400 AB	1 set
Wrench	Socket, 1/4" drive, 7/32" - 5/16" proto set #4700B	1 set
Pliers	Combination 6", Utica - 16	1
Pliers	Combination, 8", Utica - 8	1
Socket	Spark plug, 1/2" drive, 13/16", #532 HPA	1
Box	Tool, #K-20	1

Consider tool set below as alternative for above listed tools.
#9912 Proto tool kit, 15 required (1 per student)

CONSUMMABLE SUPPLIES

ITEM	DESCRIPTION-------SIZE	NUMBER
Solvent	Kerosene or other	as required
Gasoline	For engines	
Oil	Engine	
Oil	Machine	
Oil	Penetrating	
Oil	Cutting	
Oil	Gear	
Oil	Hydraulic	
Grease	Chassis	
Grease	Wheel Bearing	
Blades	Hack saw, hand	
Blades	Metal cutting band	
Supplies	Welding, arc and oxyacetylene (rods, gas, fluxes)	
Tape	Friction, plastic, masking and rubber	
Cleaning	Rags or waste	
Fasteners	Nuts, bolts, washers, cotter keys, key stock, rivets, nails, screws	
Wire	Ignition	
Terminals	Ignition, assorted	
Hose	Water	
Hose	Air	
Supplies	Paints, solvents & thinners	
Supplies	Sandpaper, steel wool and emery cloth	
Tubing	Tubing, fittings and ferrels	
Solder	Solder and fluxes	
Metal	Sheet	
Steel	Rod, angle and bar stock	
Material	Gasket and packing	
Sealer	Gasket	
Shelac	Gasket	
Shields	Grinder	
Wheels	Grinder	
Steam cleaner	Soap and fuel for	
Brushes	Wire, hand and power	
Compound	Grinding	
Fluid	Brake	
Suit	Student coveralls (30 pair)	
Suit	Instructor coveralls (2 pair)	
Files	Flat, assorted	
Drills	Number, 1-80 (1 set)	
Easy outs	Complete set (1)	

Replacement parts will be needed even for disassembly and assembly. For example: Gaskets and other minor parts for carburetor and fuel pump, rivets and knives for mower cutter bar, and rings and gaskets for engine work.

II. Specialized Equipment and Needs

1. Portable welding screens to shield welding area from rest of shop. These can be removed and stored to increase working space when welding is not being taught.

2. An exhaust system of moveable, individual hoods should be used to remove smoke and fumes. This system can be extended and adapted to remove the exhaust fumes from the internal combustion engines used in these classes.

3. Compressed air should be available throughout the shop and work area.

   (a) 1 quick-connect air outlet every 20' around the shop
   (b) 1 quick-connect air outlet in paved area

4. Water connections:

   (a) 1 hose connections inside shop near overhead door
   (b) 2 hose connections in concrete paved are for washing and steam cleaning operations

LABORATORY STORAGE

I. Tool Room

1. Wall panels, bins or cabinets for storage of special tools, tool sets, portable tools and other equipment

2. Tool room should be secured

II. Supplies Storage

1. Can be included in the tool room if necessary

2. Bins and/or locked cabinets for consumable supplies and other specialized items

III. Overhead Storage

1. Located above office, tool room, wash room and classroom areas if needed

2. Wall mounted and/or free standing racks for storage of lumber, steel and other large supplies

3. A ladder or stairway and a guard rail must be provided

4. In some instances the air compressor can be located in this area. Do not locate over classroom because of noise problem.

OUTSIDE PAVED AREA

1. The area outside of overhead door where washing and steam cleaning operations are carried out must be paved with concrete and supplied with adequate drains to carry off waste water. Asphalt must not be used in this area due to the fact that it will be broken up by the effects of grease, oil and steam. The remainder of the area can be paved with asphalt or concrete as desired.
2. Entire area should be fenced with 8' high chain link fence with one 16' wide gate and other gates as needed. Provisions should be made to secure the area during out of school hours.
3. Loading ramp constructed of concrete, 4' high, 14' wide and at least a 4' x 14' level area at top, with a down slope of 4" per foot, length will be determined by land topography where the ramp is constructed.
4. Open front shed opens into this paved area.

OUTSIDE COVERED SHED

1. Should be of pole construction with metal roof, back and ends
2. Have a concrete floor
3. Is used for storage of large equipment and machinery needed for classwork
4. May be used for storage of excess lumber and steel storage

PAINTING FACILITY

The painting area should be a separate room or building for the purposes of safety and to prevent the mist generated by spray paint equipment from coating the remainder of the facility. The facility should be thoroughly ventilated with a good filtering system and equipped with explosion proof lights. Compressed air with quick connect fittings should be available every 10 feet around the walls of the facility.

ELECTRICAL REQUIREMENTS

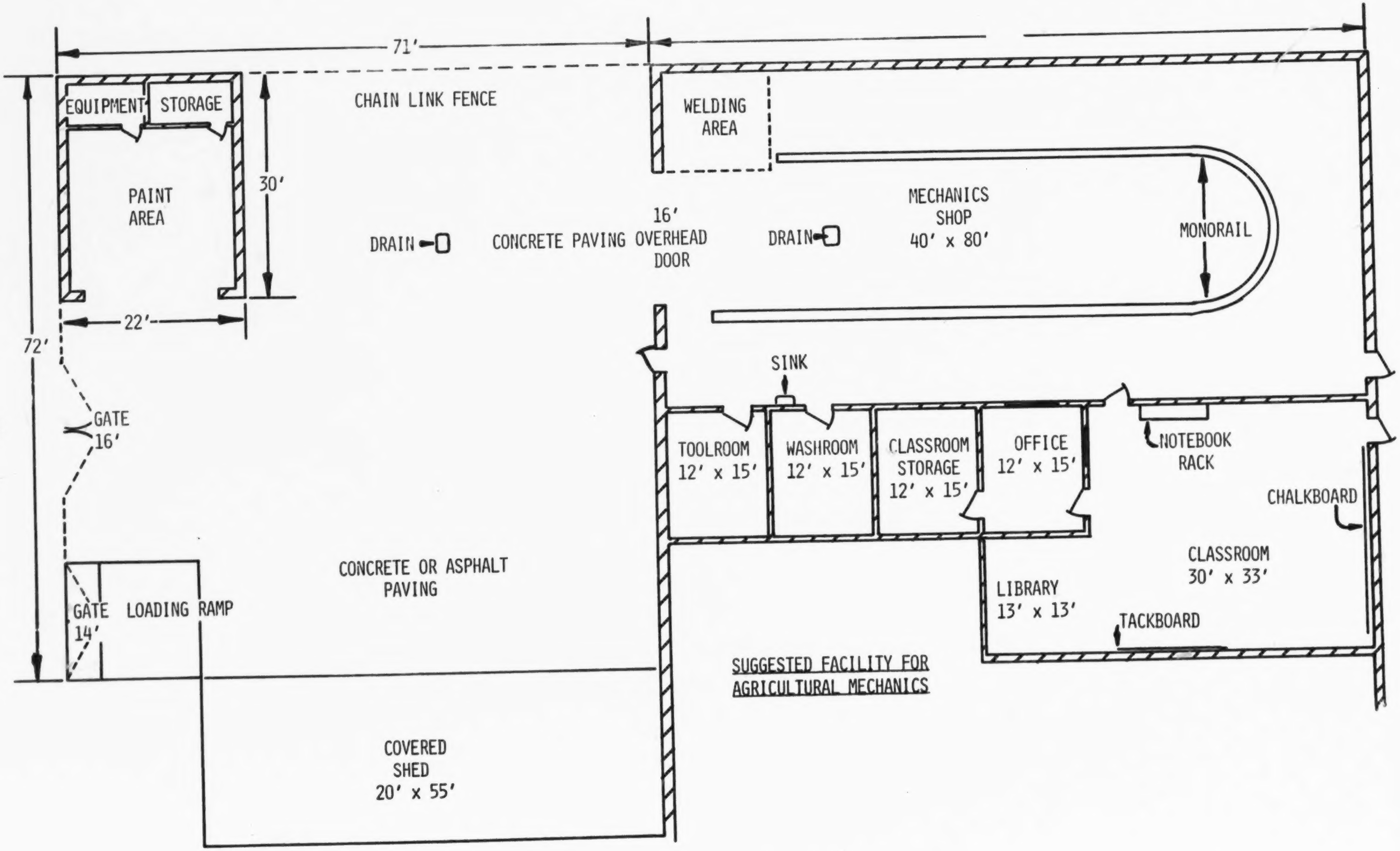
The section will outline in general terms the electrical requirements of the various areas of the facility.

1. Classroom
   1 - 110 v., 20 amp., polarized duplex outlet every 10' around classroom
2. Teacher Office
   2 - 110 v., 20 amp., polarized duplex outlets
3. Classroom Storage
   2 - 110 v., 20 amp., polarized duplex outlets

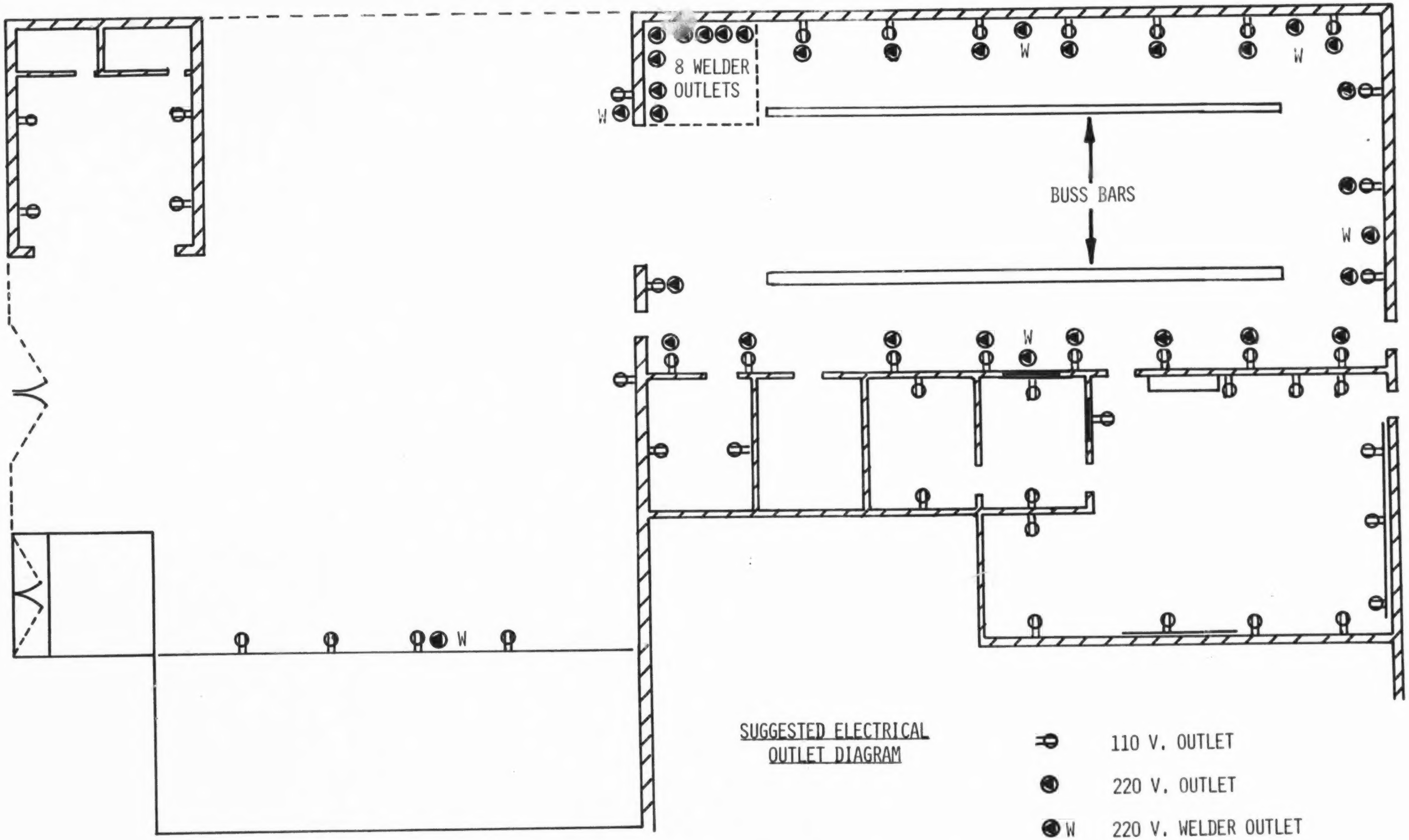
4. Library
   2 - 110 v., amp., polarized duplex outlets
5. Mechanics Laboratory
   (a) 1 - 110 v., 20 amp., polarized duplex outlets every 10' around laboratory area
   (b) 1 - 220 v., outlet every 10' around laboratory area
   (c) 12 - 220 v., welder outlets, 8 in welding area, 4 in other shop area
   (d) 2 - Buss bars, 10' in from side walls running the length of the shop to allow for flexibility in locating stationary equipment and to provide adequate electrical power in all areas of the mechanics laboratory
6. Tool Room
   1 - 110 v., 20 amp., polarized duplex outlet
7. Outside Paved Area
   (a) 2 - 110 v., 20 amp., weatherproof polarized duplex outlets
   (b) 1 - 220 v., weatherproof welder outlet
8. Covered Shed
   (a) 4 - 110 v., 20 amp., weatherproof polarized duplex outlets
   (b) 1 - 220 v., weatherproof welder outlet
9. Painting facility
   (a) 4 - 110 v., 20 amp. polarized duplex outlets
   (b) 220 v., current to operate ventilation system and air compressor
   (c) Explosion proof lights

SUGGESTED PLAN

The last part of this section consists of suggested floor plans for this facility. These plans include all areas previously outlined and contain details of certain sections for clarity. There is an electrical diagram consisting of the recommended number of outlets, size and location. Number, size, and type of lighting will be determined by state specifications and will conform to the type selected for use in the remainder of the school building.


71'
72'
30'
22'
EQUIPMENT
STORAGE
PAINT AREA
CHAIN LINK FENCE
DRAIN
CONCRETE PAVING
16' OVERHEAD DOOR
WELDING AREA
DRAIN
MECHANICS SHOP 40' x 80'
MONORAIL
SINK
TOOLROOM 12' x 15'
WASHROOM 12' x 15'
CLASSROOM STORAGE 12' x 15'
OFFICE 12' x 15'
NOTEBOOK RACK
CHALKBOARD
CLASSROOM 30' x 33'
LIBRARY 13' x 13'
TACKBOARD
GATE 16'
GATE 14'
LOADING RAMP
CONCRETE OR ASPHALT PAVING
COVERED SHED 20' x 55'

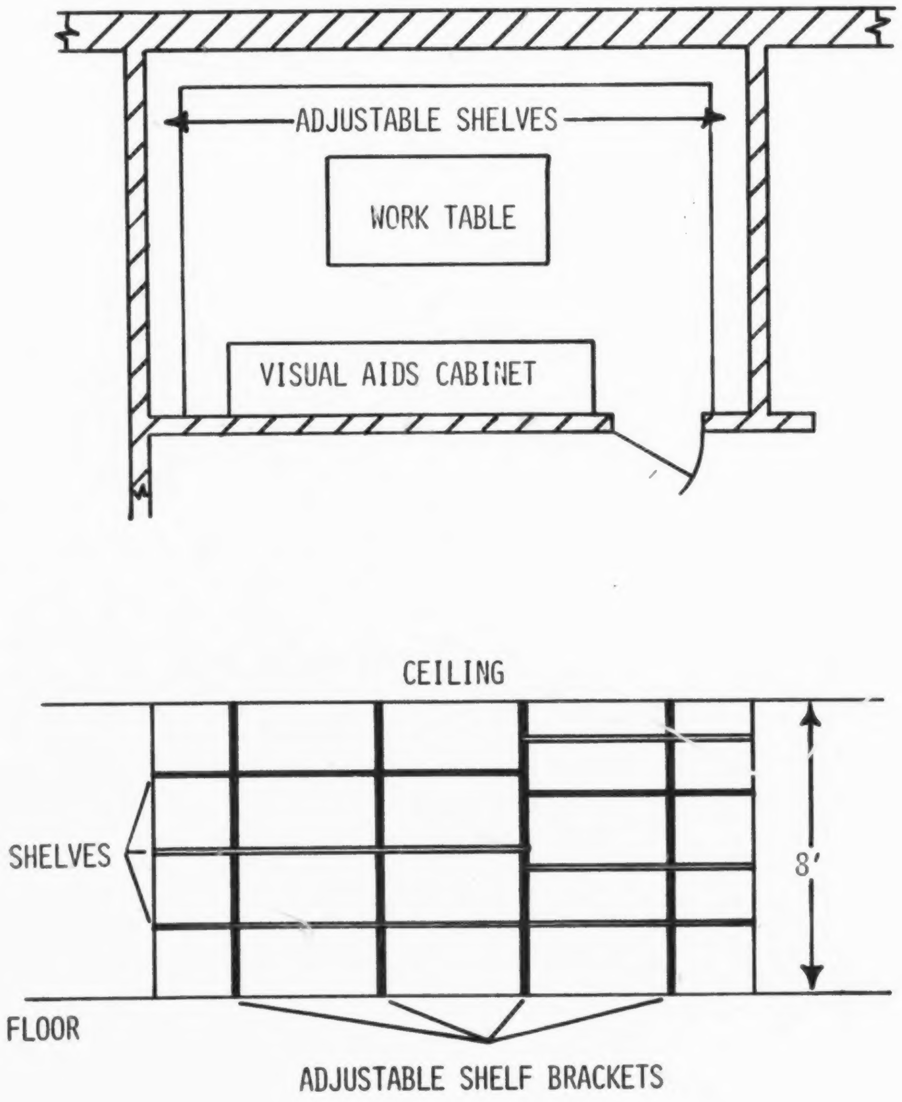
SUGGESTED FACILITY FOR AGRICULTURAL MECHANICS


8 WELDER OUTLETS
W
BUSS BARS
110 V. OUTLET
220 V. OUTLET
220 V. WELDER OUTLET

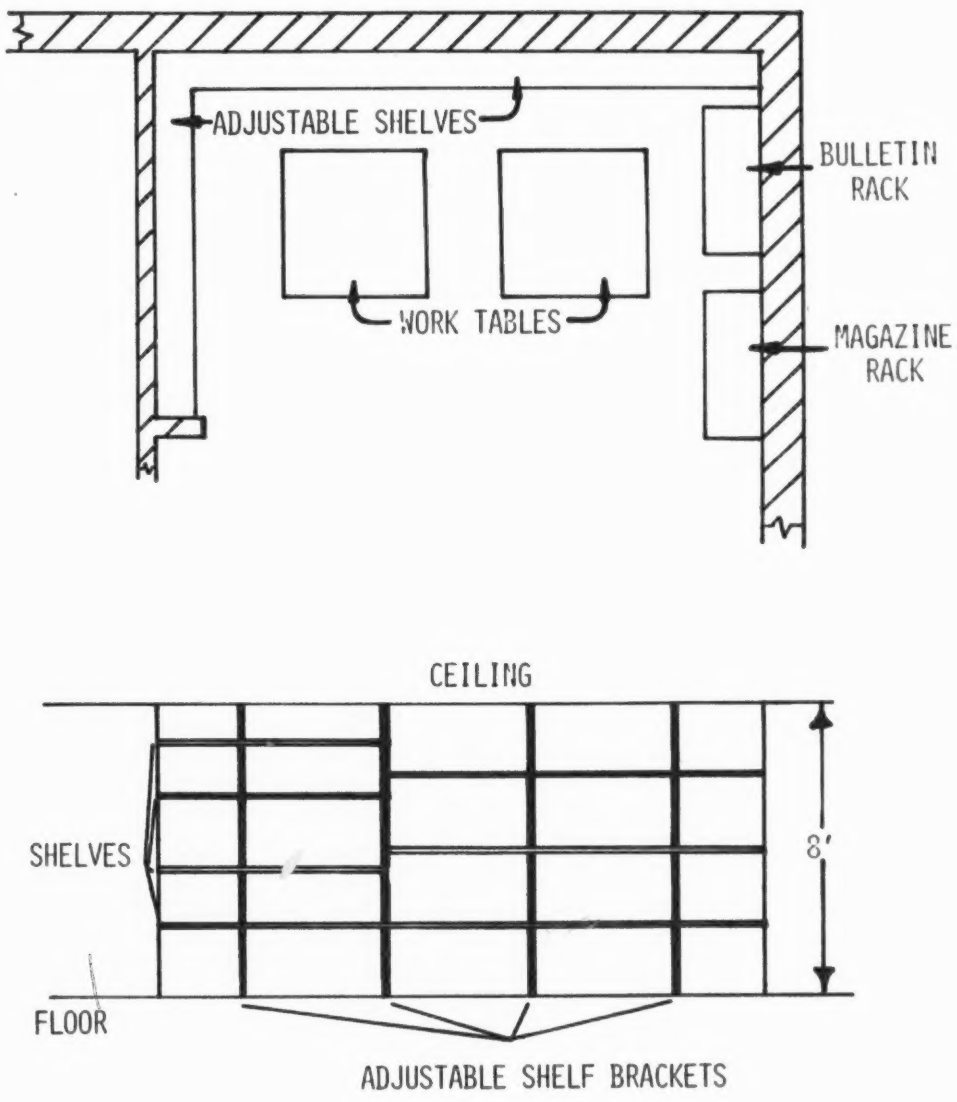
SUGGESTED ELECTRICAL OUTLET DIAGRAM

SUGGESTED ARRANGEMENT FOR CLASSROOM STORAGE AND LIBRARY

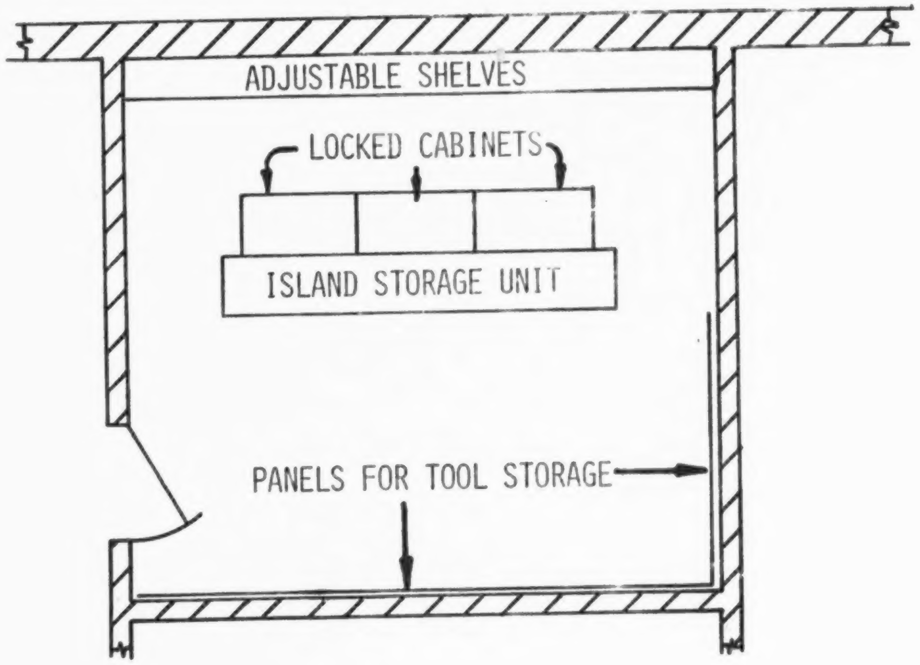
STORAGE

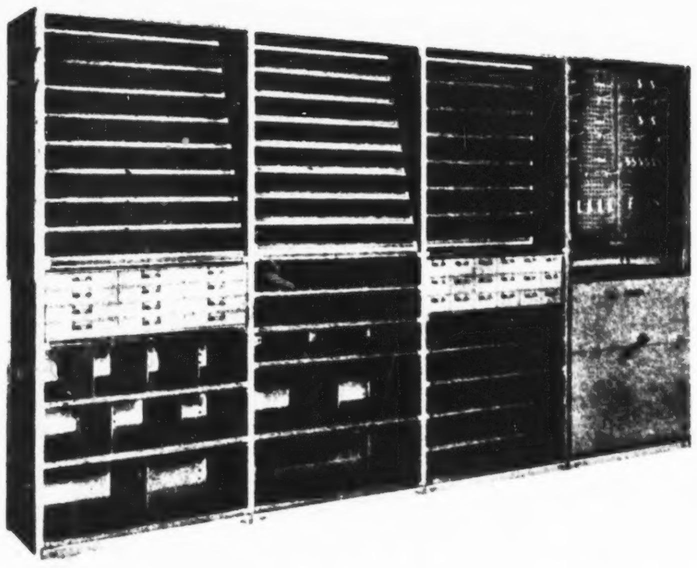

ADJUSTABLE SHELVES
WORK TABLE
VISUAL AIDS CABINET
CEILING
SHELVES
8′
FLOOR
ADJUSTABLE SHELF BRACKETS

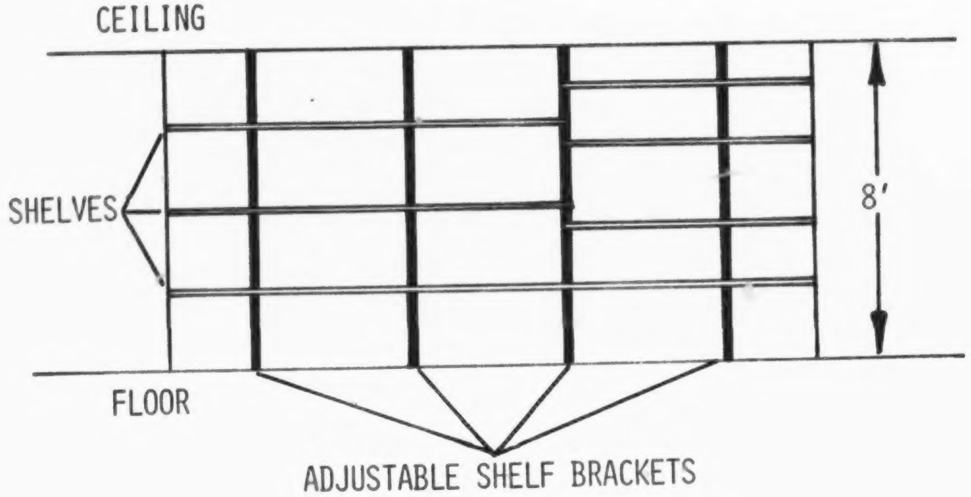
LIBRARY


ADJUSTABLE SHELVES
BULLETIN RACK
WORK TABLES
MAGAZINE RACK
CEILING
SHELVES
8′
FLOOR
ADJUSTABLE SHELF BRACKETS

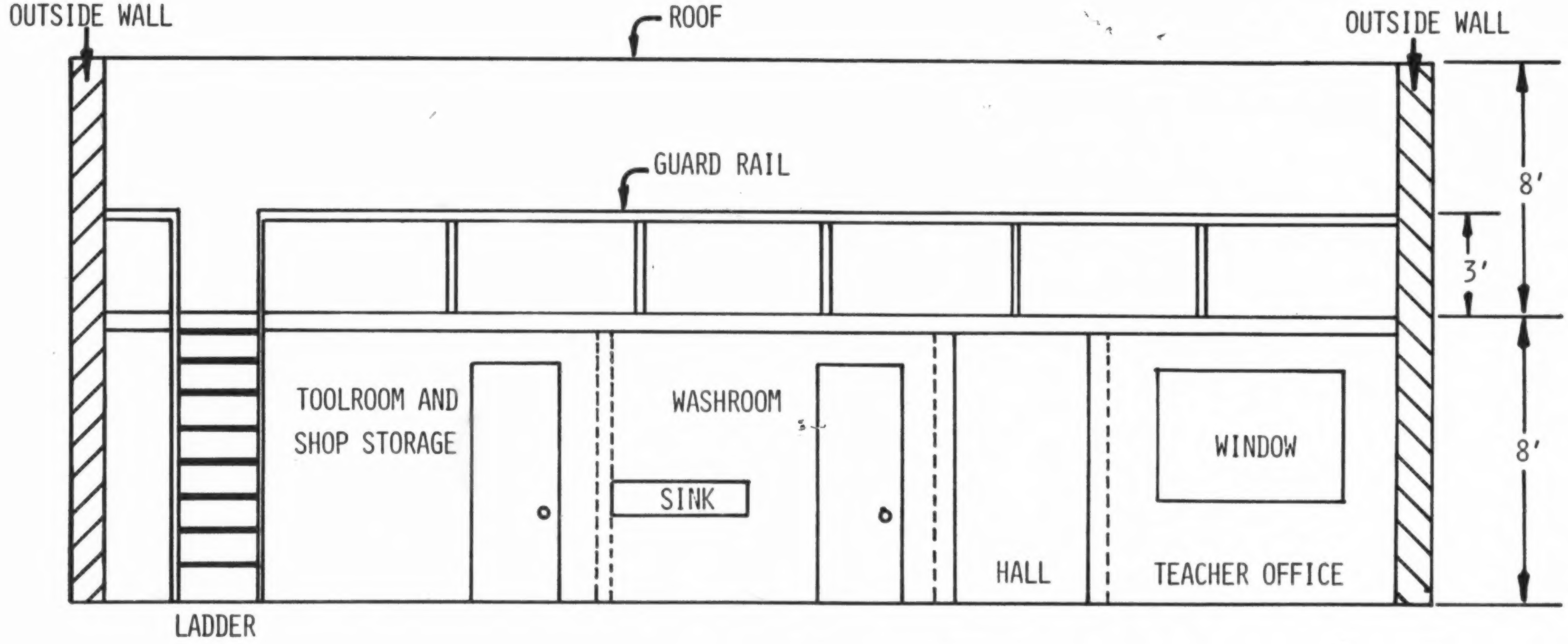
SUGGESTED ARRANGEMENT FOR SHOP STORAGE AND TOOLROOM


ADJUSTABLE SHELVES
LOCKED CABINETS
ISLAND STORAGE UNIT
PANELS FOR TOOL STORAGE

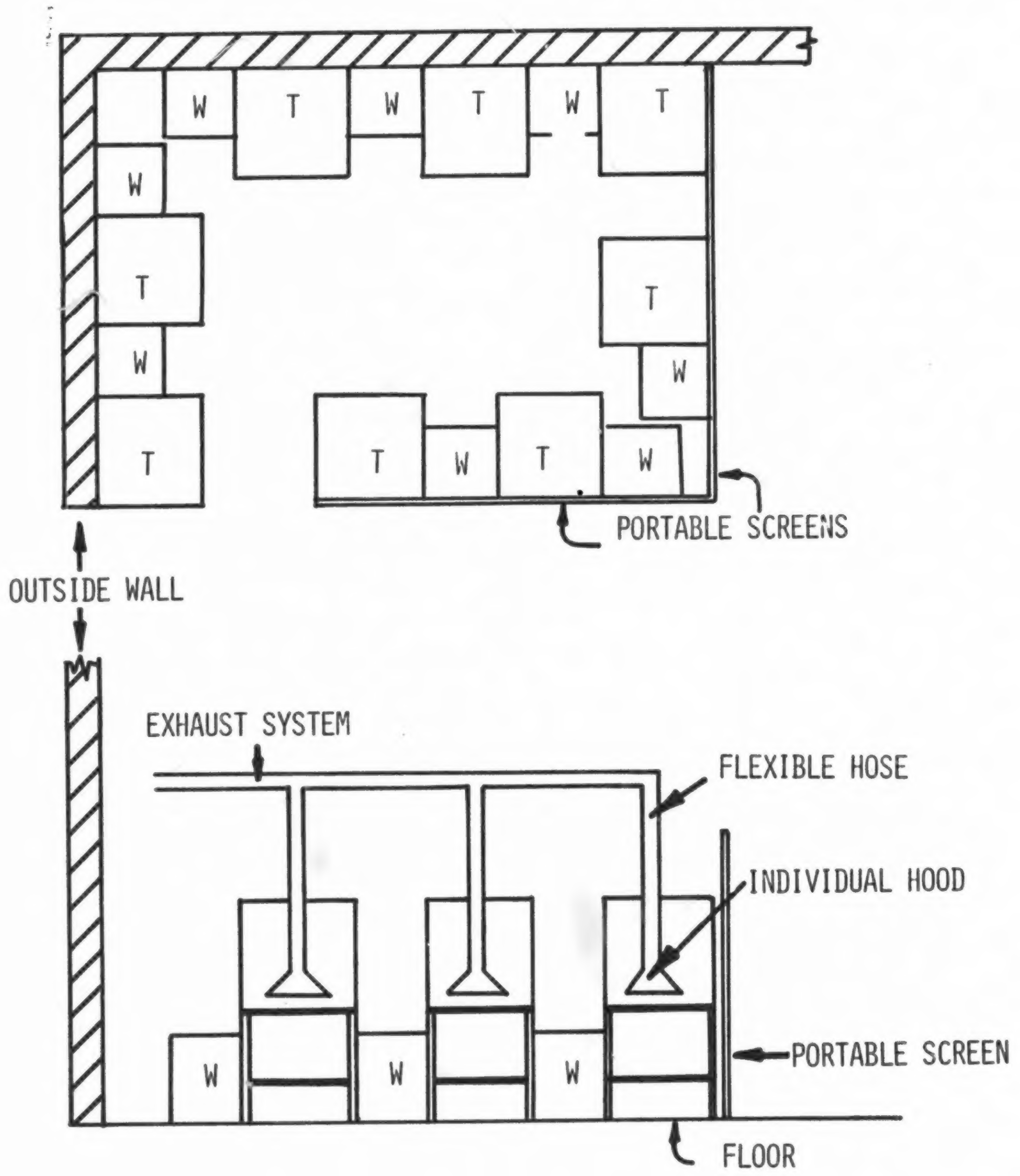

EXAMPLE OF ISLAND TYPE STORAGE UNIT


CEILING
SHELVES
8′
FLOOR
ADJUSTABLE SHELF BRACKETS

SUGGESTED OVERHEAD STORAGE


OUTSIDE WALL
ROOF
OUTSIDE WALL
GUARD RAIL
8′
3′
TOOLROOM AND SHOP STORAGE
WASHROOM
SINK
WINDOW
8′
HALL
TEACHER OFFICE
LADDER

SUGGESTED ARRANGEMENT FOR WELDING AREA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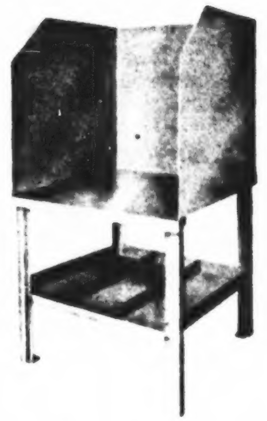
PORTABLE SCREENS
OUTSIDE WALL
EXHAUST SYSTEM
FLEXIBLE HOSE
INDIVIDUAL HOOD
PORTABLE SCREEN
FLOOR
W
W
W



EXAMPLE OF TYPE OF WELDING TABLE

T-WELDING TABLE

W-ARC WELDER

SECTION 3 - ORNAMENTAL HORTICULTURE AND FLORICULTURE

The ornamental horticulture and floriculture facility is designed for the situation where they will be the only vocational agricultural education curriculums taught in the school. The facility is based on the circumstance where there is only one teacher. In multiple teacher departments each teacher should have an individual office and where scheduling requires that each teacher meet a class during the same period, additional classroom facilities must be provided.

The programs of Ornamental Horticulture and Floriculture are combined due to their great similarity in facility and equipment requirements. The major differences are in the environmental control needed in the greenhouse facility. Floriculture requires greater environmental control with closer tolerance. Where both courses are taught in one school the greenhouse can be enlarged and partitioned into sections with separate environmental controls. Where specialized equipment is needed separate lists will show these requirements.

SPACE REQUIREMENTS

Facility Section	Recommended Area (Sq. ft.)
Classroom	960-1050
Teacher Office	150- 180
Classroom Storage	150- 180
Library	150- 180
*Washroom	100- 150
Mechanics Laboratory	1200-1500
Laboratory Storage	
tool room	100- 150
supplies storage	50- 75
overhead storage	300- 360
Outside Paved Area	2500-3000
Head House	800-1000
Greenhouse	650- 750
Cold Frame	100- 110
Hot Bed	100- 110
Soil Shed	150- 200
Shade Area	1500-2500
Land Laboratory	2-4 Acres

The following parts of this section will outline the equipment required for the various areas of the facility, some of the special requirements of the areas and a recommended list of tools and supplies.

*Require two washrooms if male and female students are enrolled.

CLASSROOM:

I. Equipment

1. Tables and chairs, or arm chairs for projected class size
2. Laboratory table or desk at front for teacher with a sink and water connections
3. Chalkboard, 3 1/2' x 20' at front, 36" from floor to chalktray
4. Tackboard, 3 1/2' x 10' at side or rear of classroom near entrance door, 36" from floor to bottom of tackboard
5. Projection screen, daylight type, 70" x 70", ceiling mounted or wall mounted, 8' - 10' from floor to top of screen, with bracket to adjust for keystone effect when used with the overhead projector
6. Each window equipped with shades, twi-nighter venetian blinds or blackout curtains so room can be darkened when using projection equipment
7. Notebook rack, to be of sufficient size to provide storage of all students' notebooks (one space per student enrolled in the curriculum)

II. Audio-Visual Equipment

1. Projection table
2. Overhead projector with projection table
3. Slide and film strip projector
4. Tape recorder
5. 35 mm camera
6. The following items to be provided if they are not readily available for use from the school visual aids or library department:
   (a) 16 mm movie projector
   (b) Super 8 mm movie projector for film loops
   (c) Opaque projector

III. Tools, Equipment and Supplies

CLASSROOM

ITEM	DESCRIPTION------SIZE	NUMBER
Cabinet	Slide and filmstrip storage	1
Aids	Slides, strips, transparencies	Collection
Chart files	For large charts	1

ITEM	DESCRIPTION------SIZE	NUMBER
Viewer	For slides and filmstrips	1
Loud speaker	Portable	1
Heating plate	Gas or electric	1
Microscope	Teaching, revolving	1
Scale	Utility, 60 pounds	1
Scale	Hanging, 100-300 pounds	1
Beakers, graduated cylinders, evaporating dish, test tubes, mortar and pestle, glass tubing, flasks		Assort.
Lab magnifier	Double lens	1

CROPS AND SOILS AREAS

ITEM	DESCRIPTION------SIZE	NUMBER
Plant food kit	Demonstration kit	1
Garden insects	Insect collection, 24 species	1
Grain insects	Insects of stored grain, collection	1
Weed seed	Bottled collection of 10-12 common weeds	1
Soil classes	Collection of soil classes	1
Soil separates	Collection of 6 soil separates	1
Thermometer	Grain bin thermometer	1
Psychrometer	Sling psychrometer (testing relative humidity)	1
Probe	Deep bin probe	1
Seives	Hand seives	4
Germinator	Deluxe germinator	1
Thermometer	Soil thermometer	1
Soil test kit	Testing kit for simple tests	1
Soil auger	Soil auger, 42" long, 6" bit	1
Soil collection	Residual soil collection, 10 samples	1
Soil seives	Soil seives	1
Measuring tape	100' steel tape	1
Hand level	Hand sighting level	1
Fertilizer samples	Set of 18 samples	1
Grass seed	Collection of 12 types of grasses	1
Legume seed	Collection of 12 types of legume seed	1
Plant tester	Plant tissue test	1

ITEM	DESCRIPTION---------SIZE	NUMBER
	HORTICULTURE AREAS	
Pruning saws	Short - 14"	2
Pruning saw	Pole pruning saw - 18'	2
Pruning shears	Hand pruner	15
Pruning shears	26" looper	6
Grafting knives	Grafting and budding	6
Grub hoes	Blade 3 3/4" x 8"	4
Spray pump	Rust resistant, 2-4 gallons	1
Hedge shearers	Long handled 21"	4
Hoes	Garden hoes	6
Rakes	Garden rakes	4
Shovels	Straight neck, round point	4
Picks	Railroad picks	4
Electric cable	For electric hot beds (plastic) 60'	3
Opener	Can opener	1
Wheel barrow	4 cubic feet	2
Garden hose	3/4" with nozzle, 25'	6
Trowels	Transplanting	4
Can snips	(For opening side of cans)	15
Seeder	Cyclone seed and fertilizer sower	1
Scales	Seed scales	1
Duster	Garden, aluminum	1
Respirator	Spray	1
Respirator	Dust	1
Roller	Lawn roller, 24"	1
Tractor	Roto spader, 5 hp	1
Spreader	Fertilizer - herbicide	1
Kit	Soil testing (Sudburry)	1
Faucet	Hose bib, 3/4" x 3/4"	4
Sprayer	Power sprayer, 15 gal. gasoline	1
Shovel	D Handle, square point, (5-10") (5-12")	10
Shovel	D Handle, round point	3
Shovel	D Handle, square point with steel strap, 7"	3
Mattock	5 lb.	2
Rolls	Lath, 6' width, 50' long	15
Boxes	Braker boxes (check with electrician)	2
Pipe	Galvanized, 3/4", 21' long	3
Lamp	Gro-lux, 4' long	4
Trowel	Hand	15
Punch	To punch holes in cans	1
Digger	Post hole	2
Fork	Spading	2

ITEM	DESCRIPTION-----SIZE	NUMBER
Planter	Bulb	2
Broom	Street	3
Trimmer	Electric hedge	1
Spade	Root pruning	1
Shovel	Balling	1
Shovel	Round point, 47" handle	1

CONSUMABLE SUPPLIES

This list contains some of the consumable supplies that should be available.

Fertilizer	Armor 60% urea, granular, 16 - 4 - 8	Assort.
Twine	Waxed wrapping twine	1 roll
Killer	Weed (tree) 2, 4 - 5 T	2 gal.
Paint	Tree marking	1 gal.
Repellant	Insect	as needed
Oil	Fuel	as needed
Flats	Metal	50
Labels	Plastic	1000
Moss	Peat moss	15 bales
Chemicals	Spray, dusting, weed killing	Assort.
Plants	Stock, new varieties	Assort.
Pearlite	Bags, 25 lbs.	6
Packs	Market, #42	200
Pots	3" or 4", metal, clay or plastic	2000
Pellets	Jiffy Peat Pellets	2000
Plastic	Polyethylene 10' wide clear	2 rolls
Plastic	Polyethylene 14' wide black	50'
Fertilizer	Liquid, artho, azalea plant food	Assort.

TEACHER OFFICE

I. Equipment

1. Office desk, steel, 3 drawers on one side and single drawer and file drawer on other side, with a large center drawer
2. Desk chair with casters, padded seat and back
3. Telephone
4. Adding machine

5. Typewriter with portable table
6. Two side chairs
7. Bookcase
8. 2-4 drawer steel filing cabinets

II. Teacher Office Supplies

ITEM	DESCRIPTION--------SIZE	NUMBER
Punch	Hand-hole punch	1
Guide	Lettering guide	1
Pens	Lettering (marking) pens 1/8" and 1/4"	2

CLASSROOM STORAGE AREA

1. Adjustable shelves on three walls for storage of teaching materials and supplies
2. Large cabinet for storage of audio-visual equipment and other teaching materials such as charts, graphs, films, etc.
3. Table, approx. 3' x 6' x 30" for set up and testing of visual aids equipment

LIBRARY

1. Library tables and chairs for students using the library area
2. Adjustable shelves on walls for storage of student reference materials
3. Magazine rack
4. Bulletin storage cabinet or rack

WASHROOM

Commodes, urinals and sinks as needed. The space requirements will vary according to the numbers of students enrolled and the availibility of other sanitary facilities in the school.

MECHANICS LABORATORY

The mechanics laboratory should have one large service door leading to the outside paved area, size 14' high x 16' wide. There should be a small 36" door along side the large service door leading to outside paved area. Direct access from classroom and teacher office is desirable. At least one floor drain should be provided near center of open work space with concrete floor adequately sloped for proper drainage.

The welding area should be shielded from the remainder of the shop and contain adequate ventilation to remove the smoke and fumes created by the welding process.

Over the office, tool room, washroom and, if required, the classroom, storage should be provided for lumber, metal and other large materials needed for use by the students. Racks, either wall or free standing, should be provided for storage of these materials. The tool room, office, washroom and classroom should have 8' ceilings, as higher ceilings will result in wasted space and loss of badly needed storage space.

The air compressor should be permanently located with quick-connect outlets every 20' around the shop on the walls.

A sink for student clean up should be provided in the laboratory area.

I. Stationary Equipment

MECHANICS LABORATORY

ITEM	DESCRIPTION----SIZE	NUMBER
Bandsaw	Horizontal, metal cutting, 8" capacity, 1 hp	1
Cleaner	Steam, Jenny IIC or equilivant	1
Compressor	Air, 8-120 psi, 7.9 cu. ft. displacement, 60 gal. tank, heavy duty, with oil and water extractor	1
Hoist	Chain, 2 ton capacity	2
Jointer	6"-8", heavy duty, 1 1/2 hp	1
Monorail	6 ton capacity	1
Press	Drill, wood working, 15", heavy duty, 1/2 hp	1
Saw	Tilting arbor, 12"-14", heavy duty, 3 hp	1
Welder	Arc, 220 v., 20% duty cycle	2
Welder	Oxyacetylene, medium duty	1

II. Mechanics Tools and Supplies

ITEM	DESCRIPTION------SIZE	NUMBER
Woodwork and Carpentry		
Bevel	Sliding T	2
Bit	Auger for use in electric drill 1/4", 3/8", 1/2", 5/8", 3/4", 1"	1 ea.
Bit	Auger 1/4" to 1 1/4" by 16ths	2 sets
Sink	Counter sink, 3/4"	2
Bit	Expansion 7/8" - 3"	1
Driver	Screw, 1/4", 5/16", 3/8"	1 ea.
Bit	Wood boring for use in brace 3/32" - 1/2" by 32nds	2 sets
Brace	Ratchet 1-10" sweep, 1-12" sweep	2
Chisels	Cabinet	1 set
Clamp	C 4", 6", 8" 1 pr. each size	6
Dividers	Wing 8" or 10"	2
Hammer	Claw, curved or straight, 16 oz.	12
Jointer	Hand saw	1
Knife	Putty, 6"	2
Level	Carpenters, 24"	1
Mallet	Wooden, hickory 1-2 1/4", 1-5 1/2"	2
Plane	Block, adjustable, 6"	1
Plane	Jack, 14"	4
Rule	Steel tape, 6'	2
Rule	Zig-zag, 6'	4
Saw	Compass, 12"	1
Saw	Crosscut, 8 or 10 pt., 26"	4
Saw	Rip, 5 or 6 pt., 26"	2
Saw	Pistol grip	1
Set	Nail, assorted sizes	4
Square	Combination, 12"	2
Square	Carpenters, 16" x 24", 1/16" markings	2
Vise	Saw, 9 1/2" jaw	1
Vise	Woodworking, continuous screw, 7" jaw	5
Beam	Trammel's Beam, adjustable	1

SKETCHING AND PLAN READING

Board	Drawing, 17" x 22"	16
Scale	Architechs, plastic (molded)	16
Set	Drawing equipment	16 sets

ITEM	DESCRIPTION--------SIZE	NUMBER
	MASONRY	
Drills	Star, 1/4" - 3/8" - 1/2" - 5/8" - 3/4" - 1"	1 set
Edger	Concrete workers, square and round corner	1
Float	Concrete workers, wood	1
Groover	Concrete workers	1
Groover	Sheet metal workers, hand 1/4" - 3/8"	1
Board	Mortar, homemade 30" x 30"	1
Screen set	Gravel, assorted size mesh	1 set
Trowel	Bricklayers, 9" - 11"	2
Trowel	Concrete finishing, 16" - 20"	2
Trowel	Bricklayers pointing, 5"	1
Level	Masonry, 48"	1
	METAL--HOT AND COLD	
Grinder	Bench 6"	2
Anvil	Blacksmiths, 150#	1
Bar	Pinch, 3' and 4'	2
Bar	Wrecking	2
Brush	Wire wheel, 6"	1
Chisel	Cold - 3/8", 1/2", 3/4", 1'	4
Cutter	Cold, 30"	1
Dresser	Emery wheel	1
Extractor	Screw	1 set
Copper	Electric soldering, 300 watt	3
Card	File	2
Hammer	Ball Peen, 1# and 2#	2
Hardy	To fit anvil	1
Nippers	End cutting	1
Screw plate	N. C. & N. F., 1/4" - 3/4" by 16ths	1
Pliers	Side cutting, combination, 8"	6
Pliers	Dragonal cutting, 8"	2
Pliers	Long mose, 6"	2
Punches	Aligning, 1/4" to 3/8"	1 set
Punches	Center, machinists, (1-1/8"), (1-7/32")	2
Punches	Pin, machinists, 1/32", 1/8", 5/32", 3/16", 7/32", 9/32"	6
Punches	Sheet metal, 3/32" to 1/2" by 32nd	1 set

ITEM	DESCRIPTION----SIZE	NUMBER
Frame	Hacksaw, adjustable	2
Set	Rivet, 3 sizes	1 set
Shield	Face, for use with grinder	2
Snips	Tinners combination, 12" long	2
Tongs	Blacksmiths Straight Lipped, 3/8", 1/2", 3/4" x 20" - 24"	3
Vise	Drill press, 6" jaws	1
Vise	Machinist's jaw	4
Gauge	Thickness, 26 blades	4
Ruler	Metal, 12", in 64ths	2

PLUMBING

Cutter	Pipe, 2" cap.	1
Pipe threader	Die stock and dies, with ratchet, cap. 1/8" - 3/4"	1 set
Pipe threader	Die stock and dies, adjustable with receding dies 1" - 2" cap.	1 set
Tool	Flaring, tubing	1
Reamer	Burring, spiral pipe end, 1/4" - 2"	1
Vise	Pipe, 1/8" - 3/4"	1
Wrench	Pipe, 14", 18", 24"	3
Saw	Hack, hand	2

SMALL ENGINES

Kit	Service, Briggs & Stratton #291661	1
Wrench	Socket, 6 pt. Thorsen, 3/8", 3/16", 1/2"	1 set
Wrench	Socket, 3/8" drive, Set #3814, flex handle, ratchet handle, extensions 5" and 10", speeder, universial joint 9/16", 5/8", 11/16", 3/4" in 12 pt.	1 set
Expander	Piston ring	1
Refacer	Valve	1
Grinder	Valve, small	1

ITEM	DESCRIPTION------SIZE	NUMBER
Cleaner	Piston ring groove	1
Wrench	Torque, 3/8" drive, 0-150 in lbs.	1
Can	Filler, oil, 1 quart and 2 quart	2
Can	Gasoline, safety, 1 gal.	1
Can	Oiler, squirt, assorted sizes	3
Lamp	Trouble	1
Puller	Gear, small 0" - 3"	1
Funnel	Fuel with filter screen	1
Gauge	Spark plug, wire	1

ELECTRICITY

Pliers	Insulated handles, 7"	4
Strippers	Wire	4
Pliers	Rounded nose, insulated handles	4
Pliers	Electrical, diagonal cutting	4
Puller	Fuse	1
Knife	2"	4
Wrench	Adjustable, 4"	2
Wrench	Adjustable, 6"	2
Pliers	Water pump	2
Pliers	Electrician	2
Iron	Soldering	2
Amprobe	Amprobe	1
Gun	Soldering, D550	1
Drivers	Screwdrivers, #TR3	4
Drivers	Screwdrivers, #400C, 6"	3
Drivers	Phillips, #2751	2
Drivers	Phillips, #2752	2
Drivers	Screwdrivers, #400C, 4"	3
Gauge	Copper wire #281	1
Tester	Circuit, #18	1

OTHER TOOLS AND EQUIPMENT

Screwdriver	Offset, 6"	1
Screwdriver	Shock proof, 4" and 6"	2
Screwdriver	Phillips #3	1
Extinguisher	Fire	1
Gun	Oil	1
Gun	Grease	1

ITEM	DESCRIPTION-------SIZE	NUMBER
Hammer	Sledge, 6 to 8#	2
Lime	Chalk, self chalking, 100'	2
Stone	Oil, combination	2
Oiler	Hand	2
Bob	Plumb	2
Tape	Steel, 50'	1
Torch	Blow, gasoline, 1 quart cap.	1
Stretcher	Wire, 4 pulley roller	1
Wrench	Adjustable, 8"	4
Wrench	Adjustable, 12"	2
Wrench	Box end, 5/16" - 1" by 16ths	1 set
Wrench	Box end-open and combination 1/4" - 3/4" by 16ths	1 set
Set	Flex set, 1/4", 1/2", 5/8", 3/4"	1 set
Wrench	Monkey, 18" and 21"	2
Wrench	Sockety master, 1/2" drive 3/8" - 1 1/8" by 32nd, 12 pt.	1 set
Set	Special Mechanics set 7/16" - 1" by 16ths	1 set
Wrench	Tappet and check nut	1 set
Pump	Gear lubricant	1
Cutter	Glass, 1/8"	12
Brushes	Paint 3-1", 3-1 1/2", 3-2"	9

PORTABLE POWER TOOLS

Saw	Electric, 8", hand	1
Drill	Electric, 1/4"	1
Drill	Electric, 1/2"	1

CONSUMABLE SUPPLIES

This list contains some of the consumable supplies that should be available in the farm mechanics shops.

Electrical		
Tape	Plastic, friction and rubber, several rolls of each	Assort.
Bulbs	Light bulbs, 25 watt	8
Connectors	Male and female (for plugging in)	24

ITEM	DESCRIPTION------SIZE	NUMBER
Wire	Grounded wire, various sizes	100'
Wire	Extension cord	Assort.
Fixtures	Outlets, switches	Assort.
Fuses	Screw type	12
Cleaning fluid	Kerosene and gasoline	25 gal.
Rags	Cleaning rags	100 lbs.
Grease	Hi-pressure	50 lbs.
Oil	S. A. E. 20-30	10 gal.
Oil	Penetrating	1 gal.
Oil	Household, light	1 gal.
Compound	Valve grinding compounds	Assort.
Cotter keys	3/4" - 2"	Assort.
Bolts	Machine bolts	Assort.
Bolts	Machine screw bolts and nuts	Assort.
Nuts	NC and NF	Assort.
Washers	Lock washers	Assort.

Woodwork

Nails	Common, various sizes	60 lbs.
Nails	Finishing, various sizes	40 lbs.
Brads	Assortment of various sizes	5 lbs.
Bolts	Carriage bolts	Assort.
Bolts	Lag bolts (screw)	Assort.
Bolts	Stove	Assort.
Nuts	Square	Assort.
Hinges	Various kinds and sizes	Assort.
Washers	Plain, various sizes	Assort.
Fasteners	Corrugated, various sizes	Assort.
Screws	Various sizes and kinds	Assort.
Paint remover	Paint and varnish remover	1 gal.
Turpentine	Turpentine or thinner	1 gal.
Paper	Sandpaper, various sizes	Assort.
Brushes	Paint brushes, various sizes	Assort.
Glue	Casein powder or casein base liquid	4 lbs.

Miscellaneous

Blades	Hack saw blades	12
Blades	Extras for power saws	Sev.
Blades	For horizontal power bandsaw metal cutting	6

ITEM	DESCRIPTION------SIZE	NUMBER
Handles	Extra handles for various tools	
Cloth	Emery cloth	
Wool	Steel wool	
Steel	Mild steel, flats and rounds, various sizes	Assort.
Putty	(For glazing)	5

III. Explanatory Notes

1. Portable welding screens to shield welding area from rest of shop. These can be removed and stored to increase working space when welding is not being taught.
2. An exhaust system of movable, individual hoods should be used to remove smoke and fumes. This system can be extended and adapted to remove the exhaust fumes from the internal combustion engines used in these classes.
3. Compressed air should be available throughout the shop and work areas.
    (a) 1 quick-connect air outlet every 20' around the shop
    (b) 1 quick-connect air outlet in paved area
4. Water Connections:
    (a) 1 hose connections inside shop near overhead door
    (b) 2 hose connections in concrete paved area for washing and steam cleaning operations

LABORATORY STORAGE

I. Tool room

1. Wall panels, bins or cabinets for storage of special tools, sets, portable tools and other equipment
2. Tool room should be secured

II. Supplies storage

1. Can be included in the tool room if necessary
2. Bins and/or locked cabinets for consumable supplies and other specialized items

III. Overhead storage

1. Located above office, tool room, washroom and classroom areas if needed
2. Wall mounted and/or free standing racks for storage of lumber, steel and other large supplies

3. A ladder or stair way and a guard rail must be provided

4. In some instances the air compressor can be located in this area. Do not locate over classroom because of noise problems.

OUTSIDE PAVED AREA

1. The area outside of overhead door where washing and steam cleaning operations are carried out must be paved with concrete and supplied with adequate drains to carry off waste water. Asphalt must not be used in this area due to the fact that the asphalt will be broken up by the effects of grease, oil and steam. The remainder of the area can be paved with asphalt or concrete as desired.
2. Entire area should be fenced with 8' high chain link fence with one 16' wide gate and other gates as needed. Provisions should be made to secure area during out of school hours.
3. Loading ramp constructed of concrete, 4' high, 14' wide and at least a 4' x 14' level area at top, with a down slope of 4" per foot, length of slope will be determined by land topography where the ramp is constructed.

HEADHOUSE EQUIPMENT

1. 10' overhead door to allow pick-up truck or other vehicle to enter for delivery of large items, i.e. soil, pots, fertilizer, etc.
2. Lockable cabinets on one wall for storage of dangerous chemicals and other specialized equipment when not in use
3. Concrete floor with drains
4. Work tables for potting work and preparation of flats
5. Headhouse located so as to provide direct access to greenhouse and other parts of total facility
6. Stone sink and hose outlet

GREENHOUSE AND EQUIPMENT

1. Automatic system for heating, cooling and ventilation of facility (fuel, oil, gas, or electric)
2. Automatic mist system for at least one half of benches in greenhouse
3. Four benches, corregated asbestoes bottoms and redwood sides
4. Four hose outlets, 2 at each end
5. Floor, concrete aisles between benches, with graveled areas under benches
6. Construction either of plastic, fiberglass or glass depending on individual requirements

7. Soil Shredder, 1/2 hp
8. Soil Sterilizer, both electric type and gas (methyl bromide) 1/8 yd. cap.

COLD FRAME

1. Located adjacent to the green house and/or head house, to be of sufficient size to adequately meet the needs of the curriculum

HOT BED

1. Located adjacent to the greenhouse and/or the headhouse, to be of sufficient size to adequately meet the needs of the curriculum
2. To include electric heating cables and/or heat bulbs to provide adequate temperature control

SOIL SHED

A covered structure near the headhouse to provide storage for soils, sand, peat, and other soil mixture components

SHADE AREA

1. This area should be located within a reasonable distance from the total facility to encourage complete use.
2. It should be of pole construction.
3. The area should be completely irrigated with two supplementary water outlets for use with garden hoses.

LAND LABORATORY

1. Area should be located adjacent to facility. Can be developed to show landscaping practices, plant materials identification and provide for student experiences. Also used for test plots, nursery and if needed turf grass establishment and maintenance.
2. Size should be determined on present and projected future needs of the agricultural programs. Suggest minimum area of 2-4 acres.

ADDITIONAL EQUIPMENT FOR FLORICULTURE

1. Walk-in refrigerator for storage of cut flowers
2. Vases, bowls, wire, ribbon, styrofoam, plastic, etc. for preparing flower arrangements
3. Seed germination rack
4. Electric vibrator seed sower

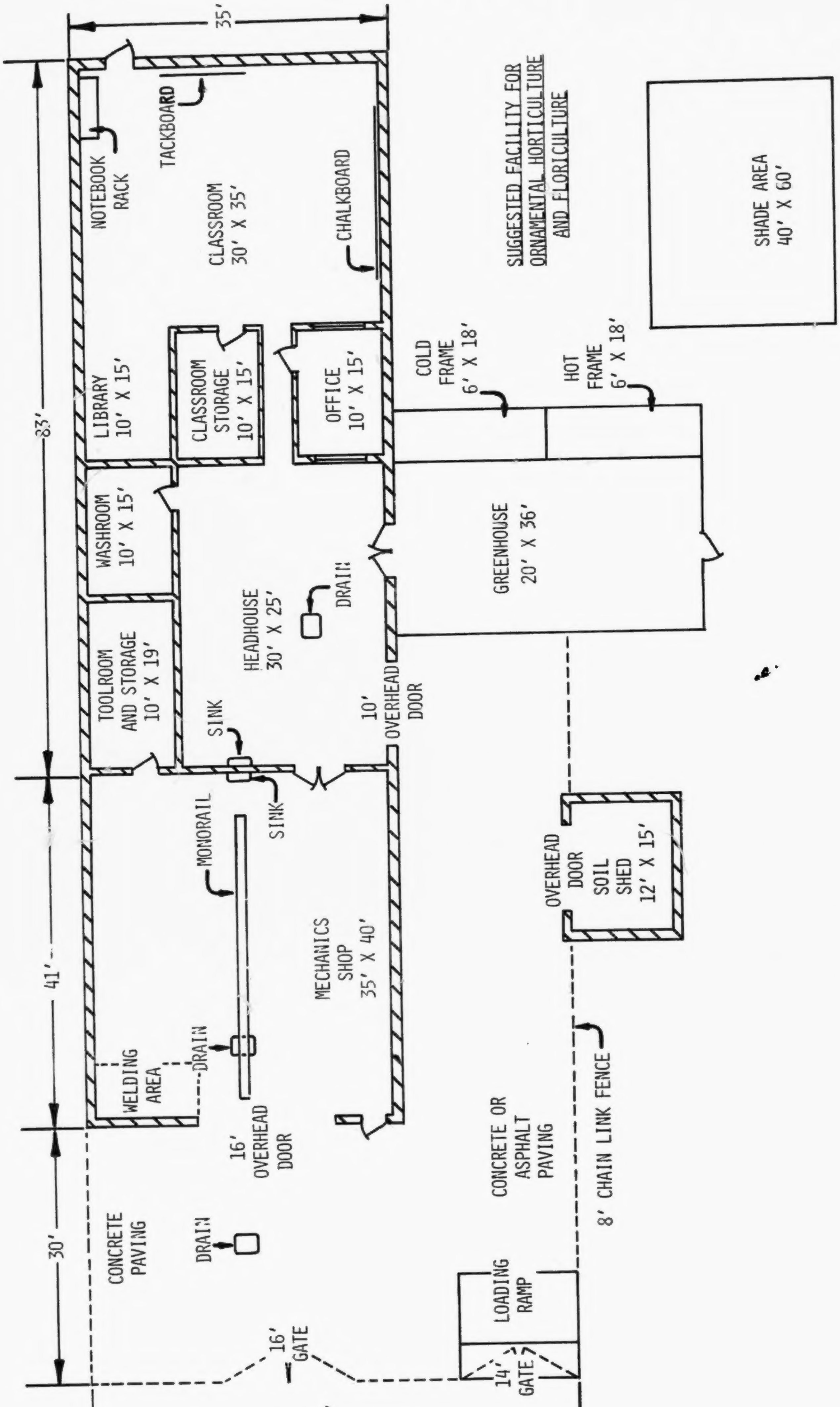
ELECTRICAL REQUIREMENTS

The section will outline in general terms the electrical requirements of the various areas of the facility.

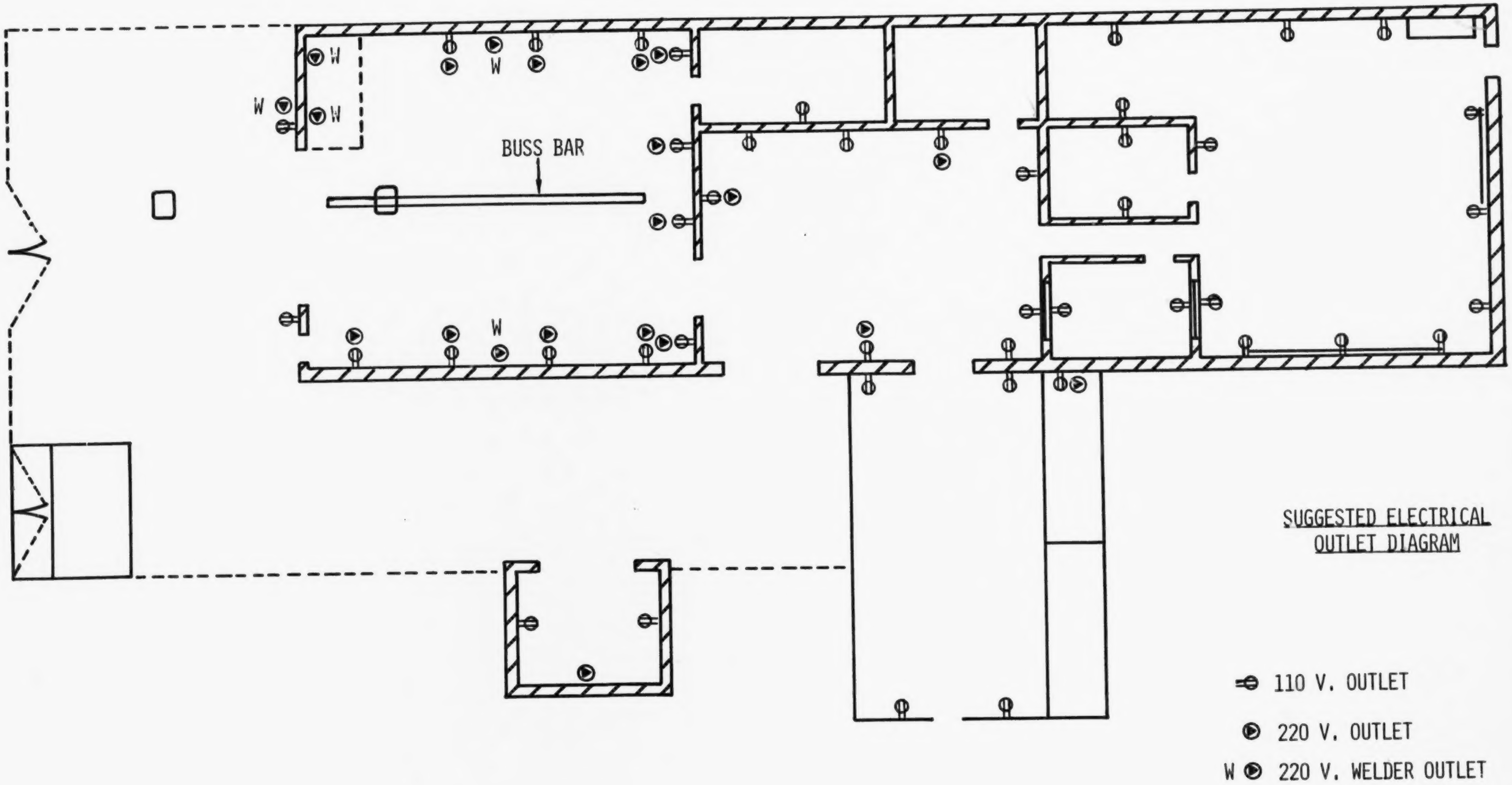
1. Classroom
   - (a) 1 - 110 v., 20 amps. polarized duplex outlet every 10' around classroom
2. Teacher Office
   - (a) 2 - 110 v., 20 amps. polarized duplex outlets
3. Classroom Storage
   - (a) 2 - 110 v., 20 amps. polarized duplex outlets
4. Library
   - (a) 2 - 110 v., 20 amps. polarized duplex outlets
5. Mechanics Laboratory
   - (a) 1 - 110 v., 20 amps. polarized duplex outlet every 10' around laboratory area
   - (b) 1 - 220 v., outlet every 10' around laboratory area
   - (c) 4 - 220 v., welder outlets, 2 in welding area, 2 in other shop areas
   - (d) 1 - Buss bar, in center of shop running the length of the shop to allow for flexibility in locating stationary equipment and to provide adequate electrical power in all areas of the mechanics laboratory
6. Tool Room
   - (a) 1 - 110 v., 20 amps. polarized duplex outlet
7. Outside paved area
   - (a) 2 - 110 v., 20 amps. weather proof polarized duplex outlets
   - (b) 1 - 220 v. weatherproof welder outlet
8. Greenhouse
   - (a) 4 - 110 v., 20 amps. polarized duplex outlets
9. Headhouse
   - (a) 7 - 110 v., 20 amps. polarized duplex outlets
   - (b) 3 - 220 v. outlets
10. Soil Shed
    - (a) 2 - 110 v., 20 amps. polarized duplex outlets
    - (b) 1 - 220 v. outlet

SUGGESTED PLANS

The last part of this section consists of suggested floor plans for this facility. These plans include all areas previously outlined and contain details of certain sections for clarity. There is an electrical diagram consisting of the recommended numbers of outlets, size and location. Number size and type of lighting will be determined by state specifications and will conform to the type selected for use in the remainder of the school building.


SUGGESTED FACILITY FOR ORNAMENTAL HORTICULTURE AND FLORICULTURE

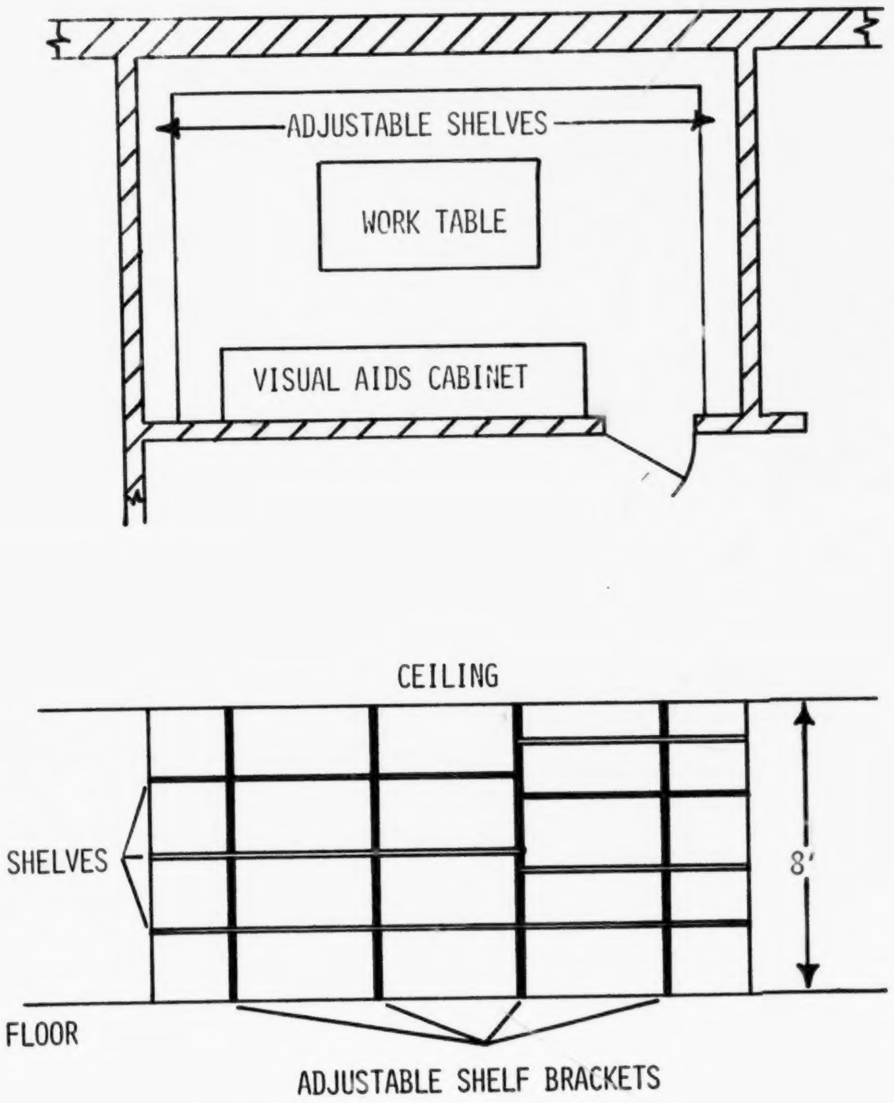
35'
83'
41'
30'
57'
NOTEBOOK RACK
TACKBOARD
CLASSROOM 30' X 35'
CHALKBOARD
LIBRARY 10' X 15'
CLASSROOM STORAGE 10' X 15'
OFFICE 10' X 15'
COLD FRAME 6' X 18'
HOT FRAME 6' X 18'
SHADE AREA 40' X 60'
WASHROOM 10' X 15'
HEADHOUSE 30' X 25'
DRAIN
GREENHOUSE 20' X 36'
TOOLROOM AND STORAGE 10' X 19'
SINK
SINK
10' OVERHEAD DOOR
MONORAIL
MECHANICS SHOP 35' X 40'
OVERHEAD DOOR
SOIL SHED 12' X 15'
WELDING AREA
DRAIN
16' OVERHEAD DOOR
CONCRETE OR ASPHALT PAVING
8' CHAIN LINK FENCE
CONCRETE PAVING
DRAIN
LOADING RAMP
16' GATE
14' GATE


BUSS BAR
W
W
W
W
W
W
⊖ 110 V. OUTLET
● 220 V. OUTLET
W ● 220 V. WELDER OUTLET

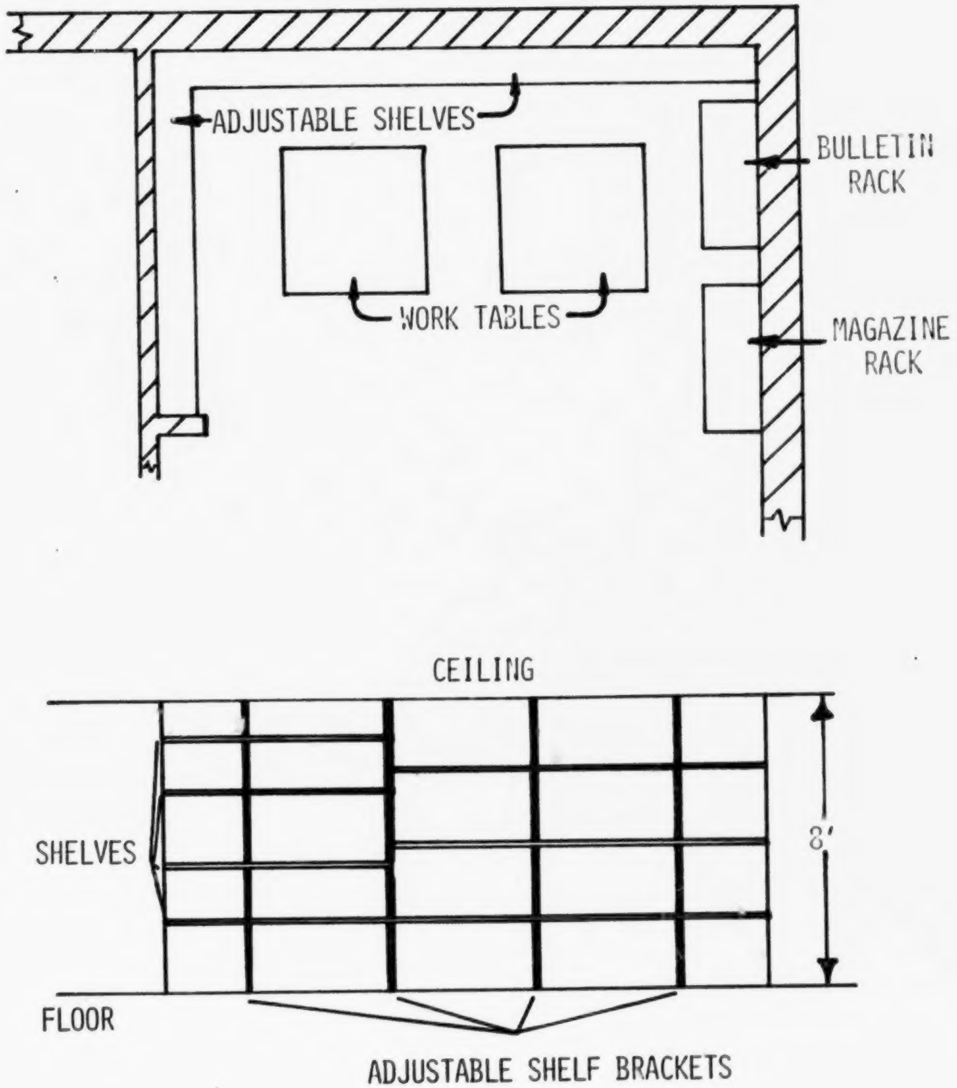
SUGGESTED ELECTRICAL
OUTLET DIAGRAM

SUGGESTED ARRANGEMENT FOR CLASSROOM STORAGE AND LIBRARY

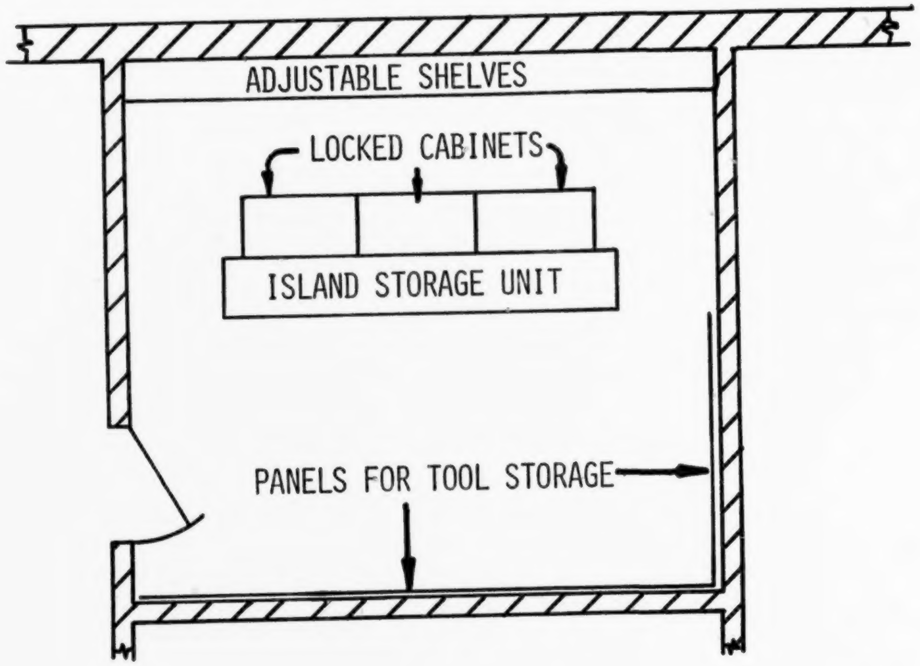
STORAGE

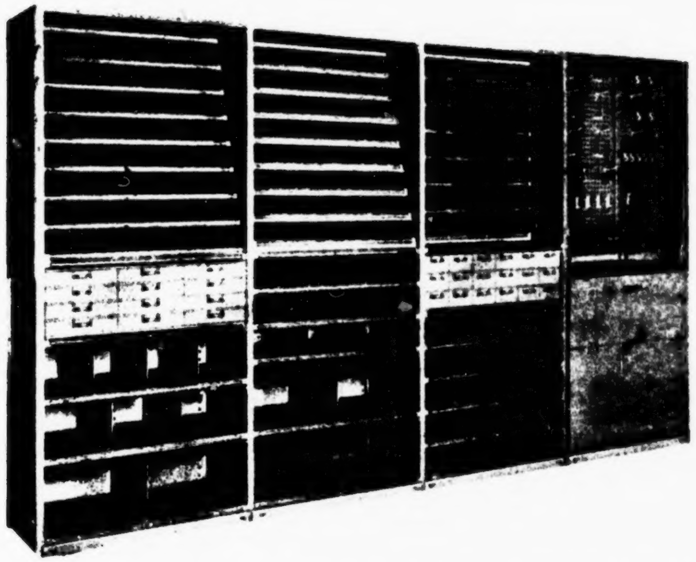

ADJUSTABLE SHELVES
WORK TABLE
VISUAL AIDS CABINET
CEILING
SHELVES
8'
FLOOR
ADJUSTABLE SHELF BRACKETS

LIBRARY

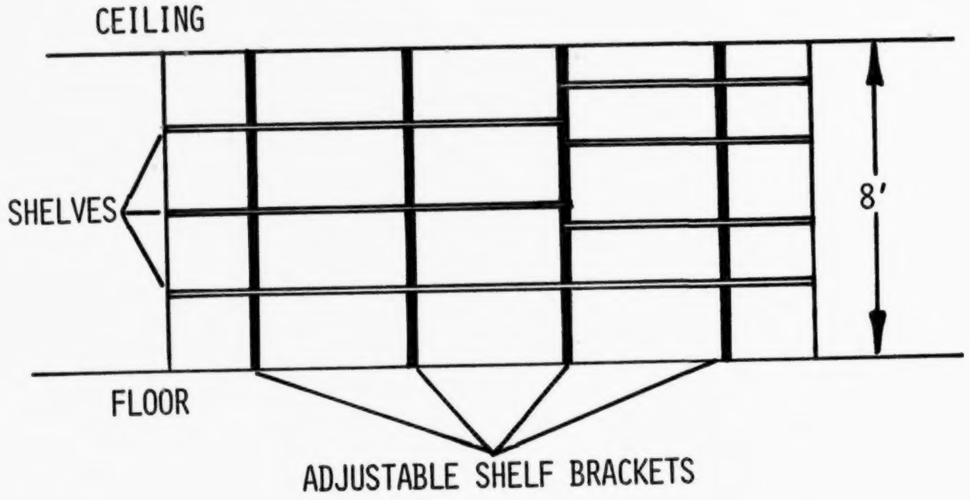

ADJUSTABLE SHELVES
BULLETIN RACK
WORK TABLES
MAGAZINE RACK
CEILING
SHELVES
8'
FLOOR
ADJUSTABLE SHELF BRACKETS

SUGGESTED ARRANGEMENT FOR SHOP STORAGE AND TOOLROOM

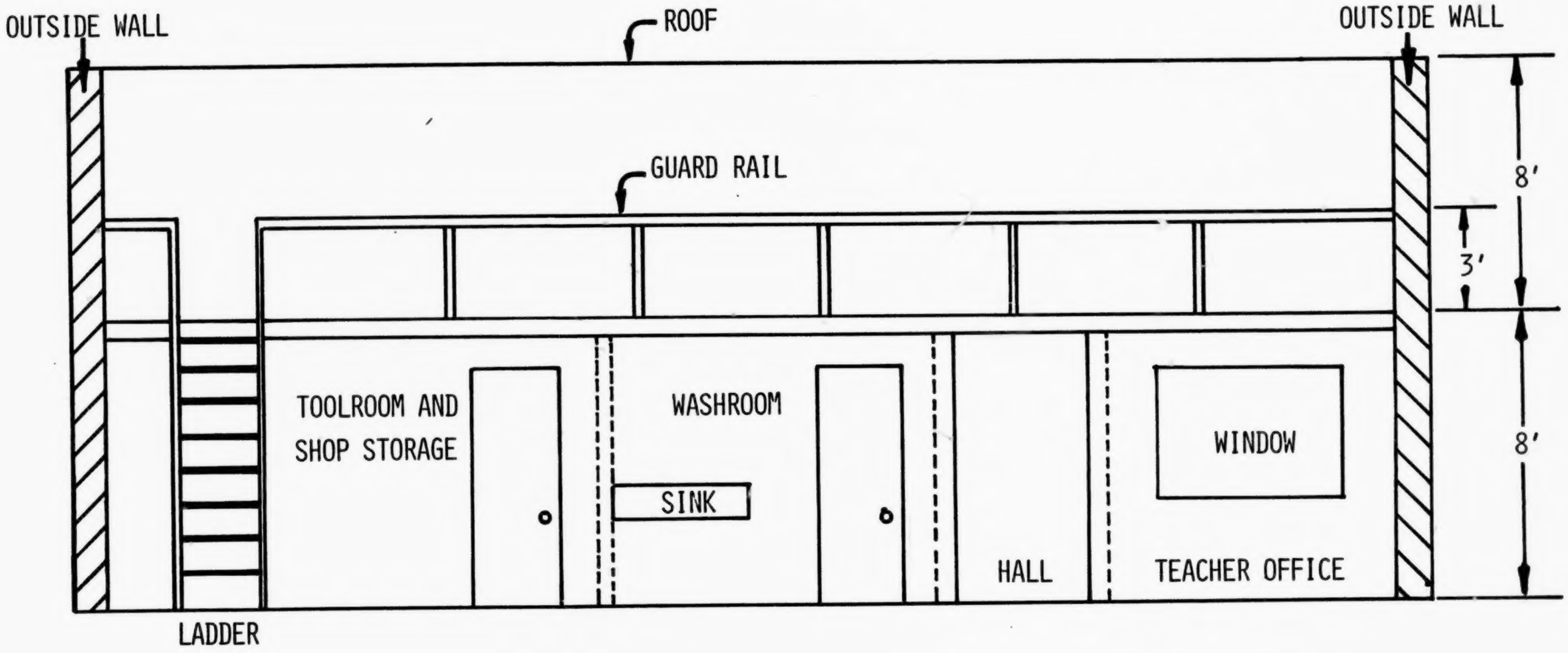

ADJUSTABLE SHELVES
LOCKED CABINETS
ISLAND STORAGE UNIT
PANELS FOR TOOL STORAGE



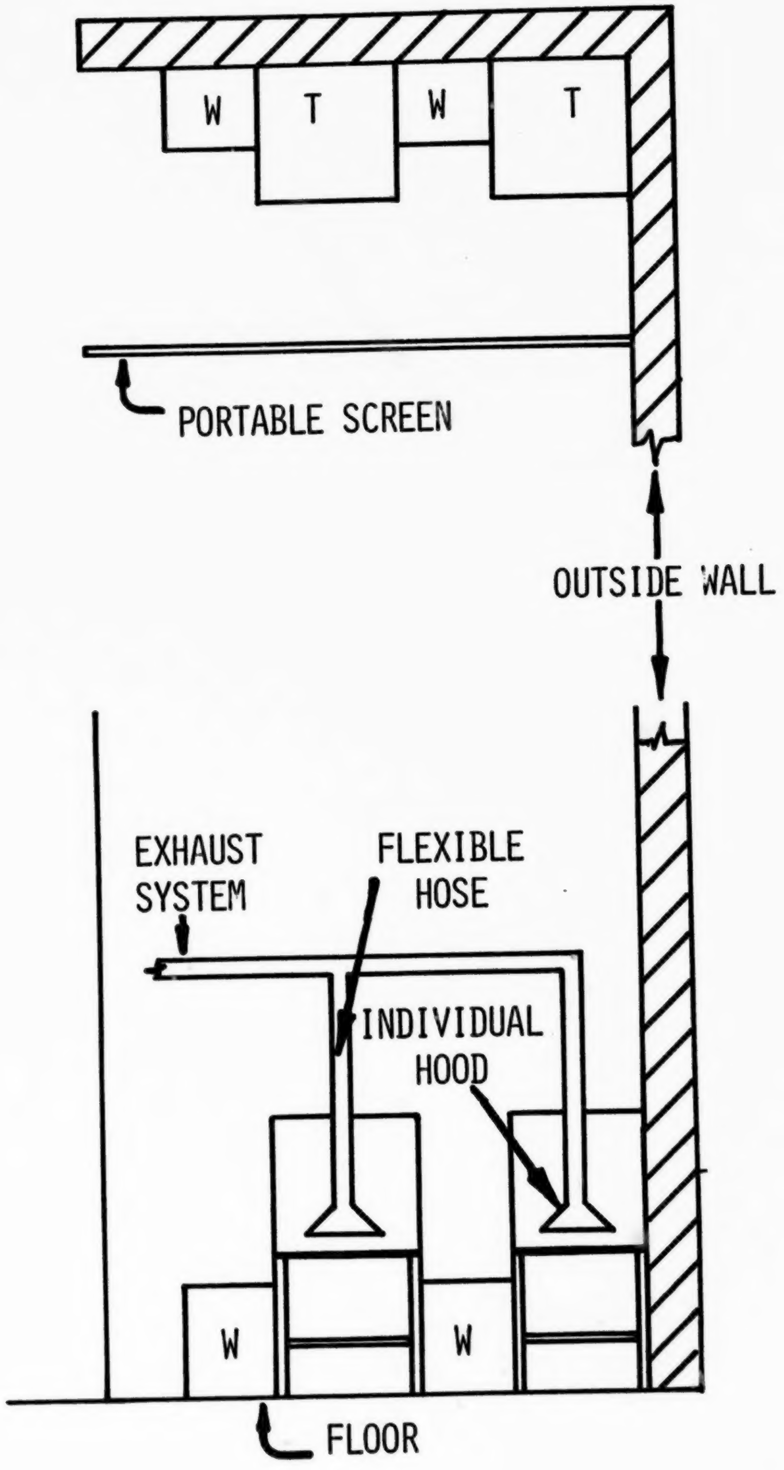
EXAMPLE OF ISLAND TYPE STORAGE UNIT

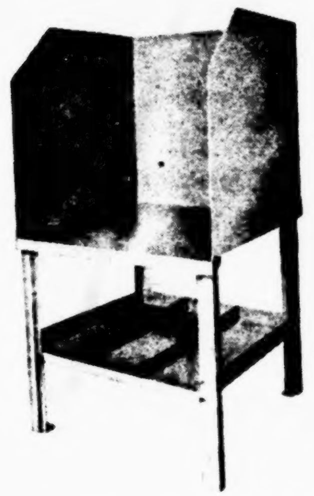

CEILING
SHELVES
8′
FLOOR
ADJUSTABLE SHELF BRACKETS

SUGGESTED OVERHEAD STORAGE


OUTSIDE WALL
ROOF
OUTSIDE WALL
GUARD RAIL
8'
3'
8'
TOOLROOM AND SHOP STORAGE
WASHROOM
SINK
WINDOW
HALL
TEACHER OFFICE
LADDER

SUGGESTED ARRANGEMENT FOR WELDING AREA


W
T
W
T
PORTABLE SCREEN
OUTSIDE WALL
EXHAUST SYSTEM
FLEXIBLE HOSE
INDIVIDUAL HOOD
W
W
FLOOR



EXAMPLE OF TYPE OF WELDING TABLE.

W-ARC WELDER
T-WELDING TABLE

SECTION 4 - AGRICULTURAL SALES AND SERVICES AND AGRICULTURAL CHEMICALS

The agricultural sales and services and agricultural chemicals facility is designed for the situation where they will be the only vocational agricultural educational curriculums taught in the school. The facility is based on the circumstance where there is only one teacher. In multiple teacher departments each teacher should have an individual office and where scheduling requires that each teacher meet a class during the same period, additional classroom facilities must be provided.

The facilities for Agricultural Sales and Services and Agricultural Chemicals courses are considered here in one unit, since it was felt that the curriculums are quite similar for at least the first year and will probably be taught within the same school in many cases. The facility can be modified if only one course is to be taught.

SPACE REQUIREMENTS

Facility Section	Recommended Area (Sq. ft.)
Classroom	1050-1250
Teacher office	150- 180
Classroom storage	150- 180
Library	150- 180
Washroom	100- 150
Chemical storage	100- 150
Laboratory and work area	1200-1500
Laboratory storage	
Tool room	150- 180
Supplies storage	50- 75
Overhead storage	300- 360
Outside paved area	1500-2500

There should be a small display window with access from the classroom and/or storage area.

CLASSROOM

I. Equipment

1. Tables and chairs, or arm chairs for projected class size
2. Laboratory table or desk at front for teacher with a sink and water connections
3. Chalkboard, 3 1/2' x 20' at front, 36" from floor to chalktray

4. Tackboard, 3 1/2' x 10' at side or rear of classroom near entrance door, 36" from floor to bottom of tackboard

5. Projection screen, daylight type, 70" x 70", ceiling mounted or wall mounted 8'-10' from floor to top of screen, with bracket to adjust for keystone effect when used with the overhead projector

6. Each window equipped with shades, twi-nighter venetian blinds or blackout curtains so room can be darkened when using projection equipment

7. Notebook rack, to be of sufficient size to provide storage of all students notebooks (one space per student enrolled in the curriculum)

8. Shelving at sides and rear of classroom for product display

9. "L" shaped sales counter in rear of classroom to simulate sales area of a store

II. Audio-Visual Equipment

1. Projection table
2. Overhead projector with projection table
3. Slide and film strip projector
4. Tape recorder
5. 35 mm camera
6. Video-tape recorder, camera and monitor
7. Telephone trainer
8. Microfiche reader
9. The following items to be provided if they are not readily available for use from the school visual aids or library department
    (a) 16 mm movie projector
    (b) Super 8 mm movie projector for film loops
    (c) Opaque projector

III. Tools, Equipment and Supplies

CLASSROOM AND LABORATORY

ITEM	DESCRIPTION-----SIZE	NUMBER
Cabinet	Slide and filmstrip storage	1

ITEM	DESCRIPTION-----SIZE	NUMBER
Aids	Slides, strips, transparencies	Collection
Chart files	For large charts	1
Viewer	For slides and filmstrips	1
Loud speaker	Portable	1
Heating plate	Gas or electric	1
Microscope	Teaching, revolving	1
Scale	Utility, 60 pounds	1
Scale	Hanging, 100-300 pounds	1
Lab magnifier	Double lens	1

TEACHER OFFICE

I. Equipment

1. Office desk, steel, 3 drawers on one side and single drawer and file drawer on other side, with a large center drawer
2. Desk chair with casters, padded seat and back
3. Telephone
4. Adding machine
5. Typewriter with portable table
6. Two side chairs
7. Bookcase
8. 2-4 drawer steel filing cabinets

II. Teacher Office Supplies

Punch	Hand-hole punch	1
Guide	Lettering guide	1
Pens	Lettering (marking) pens 1/8" and 1/4"	2

CLASSROOM STORAGE AREA

1. Adjustable shelves on three walls for storage of teaching materials and supplies.
2. Large cabinet for storage of audio-visual equipment and other teaching materials such as charts, graphs, films, etc.
3. Table, approx. 3' x 6' x 30", for set up and testing of visual aids equipment.

LIBRARY

1. Library tables and chairs for students using the library area
2. Adjustable shelves on walls for storage of student reference materials
3. Magazine rack
4. Bulletin storage cabinet or rack

WASHROOM

Commodes, urinals and sinks as needed. The space requirements will vary according to the number of students enrolled and the availibility of other sanitary facilities in the school.

SPECIAL EQUIPMENT AND AIDS FOR SALES AND SERVICES COURSE

1. Cash register
2. Scales
   (a) direct reading
   (b) balance type
3. Sales slip machine
4. Bookkeeping machine
5. Advertising layout kit
6. Credit card equipment
7. Merchandise for display
8. Lighting, revolving table and other itmes needed for display area
9. Teletype ordering systems equipment
10. Packaging equipment and supplies; paper, tape, string, bags, etc.

SPECIAL EQUIPMENT AND AIDS FOR AGRICULTURAL CHEMICALS COURSES

1. Wheel barrow
2. Chain saw
3. Soil testing equipment (Sudburry kit)
4. Tree injector
5. Back sprayers (5)
6. Power sprayer (1) with a good nozzle
7. Measuring containers
8. Samples of pump types used for chemicals
9. Protective and safety items: masks, aprons, safety glasses, clothing

CONSUMABLE SUPPLIES - AGRICULTURE SALES AND SERVICES

1. Record forms
   inventory sheets
   sales slips
   cash account books
   credit sales slips

2. Grooming Supplies
   soap, combs, deodorant, etc.
3. Currency for making change, etc.

CONSUMABLE SUPPLIES - AGRICULTURE CHEMCIALS

1. Insecticides--samples of those most commonly used in area, keep up to date
2. Herbicides
   2, 4, 5-T
   Treflan
   Atrazine
   Simzyine
   MH-30
   Dybar
3. Fertilizers, granular, liquid
4. Fungicides

NOTE-AGRICULTURE CHEMICALS

In this course space must be provided outside for short term storage of various types of spraying equipment. Also space must be available to allow for student practice in calabrating the various types of spray application equipment.

MECHANICS LABORATORY

The mechanics laboratory should have one large service door leading to the outside paved area, size 14' high x 16' wide. There should be a small 36" door along side the large service door leading to outside paved area. Direct access from classroom and teacher office is desirable. At least one floor drain should be provided near center of open work space with concrete floor adequately sloped for proper drainage.

The welding area should be shielded from the remainder of the shop and contain adequate ventilation to remove the smoke and fumes created by the welding process.

Over the office, tool room, washroom and if required the classroom, storage should be provided for lumber, metal and other large materials needed for use by the students. Racks, either wall or free standing, should be provided for storage of these materials. The tool room, office, washroom and classroom should have 8' ceilings, as higher ceilings will result in wasted space and loss of badly needed storage space.

The air compressor should be permanently located with quick-connect outlets every 20' around the shop on the walls.

A sink for student clean up should be provided in the laboratory area.

I. Stationary Equipment

MECHANICS LABORATORY EQUIPMENT

ITEM	DESCRIPTION-----SIZE	NUMBER
Bandsaw	Horizontal, metal cutting, 8" capacity, 1 hp.	1
Bench	Work, 2 man.	as needed
Bench	Work, 4 man.	as needed
Cleaner	Steam, Jenny IIC or equilivant	1
Compressor	Air, 8-120 psi, 7.9 cu. ft. displacement, 60 gal tank, heavy duty, with oil and water extractor	1
Grinder	Pedestal, 10", heavy duty, 1 hp	1
Hoist	Chain, 2 ton capacity	1
Jointer	6"-8", heavy duty, 1 1/2 hp	1
Monorail	2 ton capacity	1
Press	Drill, metal working, 20", heavy duty, 1 hp	1
Saw	Radial Arm, 12", heavy duty, 3 hp	1
Saw	Tilting arbor, 12"-14", heavy duty, 3 hp	1
Welder	Arc. 220 v., 20% duty cycle	2
Welder	Oxyactylene, medium duty	1

FARM MECHANICS AREA

Woodwork and Carpentry

Tools in the section are for a small working group, three to five students, and are to be placed in a woodworking cabinet. One cabinet for every three or four students is desirable.

Brace	Ratchet, 10" swing	1
Bits	Auger, 1/4"-1" by eights	Set
Bit	Countersink, rosehead - 3/4" x 5"	1
Chisels	Wood, heavy duty, 1/4"-1" by 1/4's	Set
Drawknife	10" blade	1
Hammer	Bell faced, 16 ounces	1
Bar	Wrecking, gooseneck, 18"	1

ITEM	DESCRIPTION---------SIZE	NUMBER
Plane	Smoothing, 10"	1
Plane	Block, 6"	1
Saw	Hand, crosscut, 26" (8 or 10 points)	1
Saw	Coping, 6 1/2" blade	1
Saw	Keyhole (10 points)	1
Square	Framing 16" x 24"	1
Square	Sliding T-bevel 10"	1
Square	Combination, 12"	1
Screwdrivers	Set of bits, 1/4", 5/16", 3/8"	Set
Screwdrivers	Set shockproof, 6", 8", 10"	Set
Screwdrivers	Phillips, 6", 8", 10"	Set
Files	Mill files, 6", 8", 10"	Set
Files	Wood rasp, 12"	1
Scraper	Wood, 3" blade	1
Oilstones	Combination, 6" x 2"	1
Mallet	Carpenter's, 16 ounces	1
Knife	Putty	1

Woodwork and Carpentry

Tools in this section should be placed in the central or general tool room.

Bits	Electrician's 1/4", 1/2", 3/4"	Set
Bits	Expansion, 7/8"-3"	Set
Bits	Extension, 15"	1
Clamps	Adjustable bar, 3'-8'	2
Clamps	"C" Clamps, 5" and 10"	2
Hammers	Ripping, 20 ounces	2
Planes	Jack, 15"	2
Saws	Miter saw, 10 points	1
Saw sets	(For circular saws)	2
Squares	Try and mitre, 8"	2
Tapes	Return tape, 12'	2
Rules	Extension rule, 6'	2
Tape	Steel tape, 100'	2
Bob	Plumb bob, 12 ounces	4
Levels	Carpenters level (18" and 24")	1
Chalkline	Self chalking, 50'	2
Divider	Wing, 10"	1
Calipers	One each inside and outside, 6"	2
Files	Bastard, flat (2 each of 8" and 10")	4
Files	Bastard, half round, 8" and 10"	2
Files	Bastard, round, 8" and 10"	2

ITEM	DESCRIPTION-----SIZE	NUMBER
Files	Slim taper, 6"	2
Files	File handles, assorted sizes	24

MISCELLANEOUS WOODWORKING TOOLS

Paint brushes, medium	(one each of 2", 3", 4")	3
Glass cutter		2
Wire brushes	7 1/2" x 2 7/8"	2
Vises	Woodworking 4" x 10" jaws, open 12"	3

METAL WORK

Hot and Cold		
Chisels	Cold, 1/4", 3/8", 1/2", 5/8", 3/4", 1"	6
Punches	Center punch 1/2" x 6"	3
Punches	Machine punch 5/8" x 7"	2
Punches	Line-up punch 1/4" x 5/8" x 12"	2
Hammers	Ball peen (one each of 12, 20, and 24 ounces) (set)	3
Clippers	Bolts clipper, one large and one small	2
Vises	Machinist vise, swivel base, 5"	2
Taps and dies	Screw plate, NC and NF, 1/4" to 1" by 16ths	Set
Screw extractors	Nos. 1, 2, 3, 4, 5, 6	Set

Welding Equipment

Grinder	General purpose bench, 1/4 hp motor	1
Hammers	Chipping hammers	4
Brushes	10" handle	6
Gloves	Leather	6
Goggles	Chipping and grinding goggles, cup type	6-10
Goggles	Welding goggles, cup type	1*
Helmets	Welding helmets	1*

* One for each student

ITEM	DESCRIPTION--------SIZE	NUMBER
Torch	Carbon arc	1
Curtain	Welding curtain for welding area	1

Sheet Metal

Torch	Propane torch, tips and tank	1
Mallets	Tinner's mallet 2 1/2" x 6"	2
Snips	Tinner's snips, straight and curved	2
Soldering iron	Electric, removable tips, 300 watt	1
Rivet kit	Includes tools and rivets	1
Hammer	Riveting hammer, 12 ounces	1
Seamer	Hand seamer, 3 1/2" blade	1
Groover	Hand groover, 3/8"	1

Plumbing

Pipe dies	1" to 2"	Set
Pipe dies	Ratchet type 1/4"-1"	Set
Cutter	Pipe, 1/4"-1 1/4"	1
Cutter	Copper tubing, 3/16"-1 1/8"	1
Flaring tools	Copper tubing, 3/8"-1/2"	Set
Reamer	Burring bit brace	1
Wrenches	Pipe wrench, 18"	2
Wrench	Pipe wrench, 12"	1
Vise	Pipe, 1/8"-2"	1

Farm Tractors, Engines and Machinery

Tools in this section are suggested for a small working group, three to five students, and are to be placed in a cabinet for tractor and machinery repair. One cabinet for every three or four students is desirable.

Hammer	Ball peen, 16-20 ounces	1
Punches	Center punches	Set
Chisels	5/16"-1 1/2"	Set
Gauges	Thickness gauges, .003"-.015"	Set
Pliers	One each: needle nose, diagonal	Assort.
Pliers	Channel lock and vise-grip	2
Screwdrivers	Machine, 6", 8", 12"	Set

ITEM	DESCRIPTION--------SIZE	NUMBER
Wrenches	Socket and box-end combination 1/4", 3/8", 1/2"	Set
Wrenches	Allen, (Hex-head)	Set
Wrenches	Spark plug	Set

Farm Tractors, Engines and Machinery

Tools in this section should be placed in a general (central) tool room or cabinet.

Trolley	Trolley for I-beam, 2 tons	2
Jack	Hydraulic, 3 tons	1
Jack stands	Two tons	2 pair
Cans	Five gallon for kerosene	2
Cans	One gallon for gasoline	2
Can	With top for water, 15-25 gal.	1
Cans	Oilers, 1/3-1/2 pint	4
Creeper	(For getting under machines)	1
Grease guns	Pressure, lever type, 16 ounces	2
Gauges	Spark plug, wire type	2 sets
Light	Timing light	1
Charger	Battery charger	1
Cable	Jumper cable	1
Pliers	Combination, 6"	4
Screwdrivers	Off-set	2
Service light	Heavy cord 25', bulb shield	1
Tire gauge	Heavy duty	1
Puller set	Gear and bearing puller, 3 sets of jaws	1
Wrench	Torque, 1/2", 0-150 ft. lbs.	1
Wrenches	Ignition	Set
Wrenches	Flexible socket	Set
Wrenches	Deep socket	Set
Wrenches	Drive socket - 3/4"	Set
Wrenches	Impact, electric	1
Punches	Gasket punches	Set
Pick-up	Pick-up tool, magnetic	1

Small Gasoline Engines

Wrenches	Open end, 5/16" to 1" by 16ths	Set
Wrenches	Box end, 5/16" to 1" by 16ths	Set
Screwdrivers	Standard, 4", 6", 8"	1 ea.

ITEM	DESCRIPTION-----SIZE	NUMBER
Screwdrivers	Phillips, 4", 6"	1 ea.
Screwdrivers	Offset, 4", 6"	1 ea.
Chisel	Cold, flat and cape	Set
Punches	Assorted	Set
Pliers	Needle nose	4
Pliers	Combination	4
Pliers	Water pump	2
Pliers	Vise grip	2
Hammer	Ball peen, 16 ounces	3
Wrench	Adjustable, 8"	1
Wrench	Adjustable, 10"	1
Hammer	Plastic	3
Gauge	Feeler, 26 blades	2
Gauge	Spark plug, wire	2
Tool	Ignition tool set	1
Bar	Pry, 18"	1
Wrench	Set 3/8" drive, socket wrenches with 13/16" deep socket	Set
Wrench	Pipe 18"	1
Oiler	Hand	1
File	Flat, 8"	3
Brush	Wire, hand	3
Knife	Putty	3
Screwdriver	Hex	Set
Wrench	Torque, 3/8" drive, 0-600# in lbs.	1
Light	Trouble	2

Power Tools and Large Equipment

Drill	Portable, electric, 1/4"	1
Drill	Portable, electric, 3/4"	1
Grinder	Portable grinder, 1" x 6" with attachment for drill bits and chisels	1
Dresser	Wheel dresser	1
Drill bits	High speed, 1/16"-1/2" by 64ths, 1/2"-1" by 8ths	Set
Drill bits	Masonry drills, 1/4"-3/4" by 16ths	Set
Saw	Portable, heavy duty, 7" blade	1

Miscellaneous Tools and Equipment

ITEM	DESCRIPTION-------SIZE	NUMBER
Diggers	Post-hole, 9" blade	2
Fire blanket	(Safety items in shop)	1
Fire extinguisher	CO_2, 10 lb. size	1
First Aid center	Assortment of needs	1
Step ladder	2 sections, 30'	1
Level	Bostrum level, utility	1
Lettering set	(For marking tools) 1/8" letters	1
Engines, used	Small gas, 2 and 4 cycles	1*
Motors, used	Electric motors, different types	1*

II. Consumable Supplies

This list contains some of the consumable supplies that should be in the agricultural mechanics shop.

Arc Welding

Steel electrodes	1/8" and 5/32"	100 lbs.
Cast electrodes	1/8"	10 lbs.
Carbon rods	3/16" and 3/8" x 6" cored and copper coated	12
Steel metal	Scrap steel 1/4" thick, 4" wide, 12' long	500 lbs.

Oxy-acetylene Welding

Steel rods	Mild steel oxy-acetylene filler rods, 1/16", 1/8", 3/32"	40 lbs.
Cast rods	Cast iron oxy-acetylene filler rods 1/8"	5 lbs.
Bronze rods	Bronze oxy-acetylene filler rods, 1/16", 1/8", 3/32"	15 lbs.
Steel bar	Mild steel bar 1/8" x 1"	100'
Rods	Assortment for hardfacing	Assort.
Flux	Flux for cast iron and brazing	5 lbs.
Flints	Igniter flints	12

* One for each student

Sheet Metal

ITEM	DESCRIPTION-------SIZE	NUMBER
Metal sheets	Galvanized steel sheets, 4' x 4' 28 gauge	4
Metal sheets	Stainless steel 1' x 4', 28 gauge	4
Screws	Sheet metal, 1/2" No. 4	5 lbs.
Solder	Solder bar, 50-50	2 lbs.
Solder	Solder, spool, acid and rosin core	2 lbs.

Plumbing

Pipe	Galvanized pipe, 1/2" and 3/4"	100'
Pipe	Copper pipe, 3/8" and 1/2"	40'
Fittings	Coupling, elbow, tee, union, nipple	Assort.

Machinery

Cleaning fluid	Kerosene and gasoline	25 gal.
Rags	Cleaning rags	100 lbs.
Grease	Hi-pressure	50 lbs.
Oil	S. A. E. 20-30	10 gal.
Oil	Penetrating	1 gal.
Oil	Household - light	1 gal.
Cotter keys	3/4"-2"	Assort.
Bolts	Machine bolts	Assort.
Bolts	Machine screw bolts and nuts	Assort.
Nuts	NC and NF	Assort.
Washers	Lock washers	Assort.

Woodwork

Nails	Common, various sizes	60 lbs.
Nails	Finishing, various sizes	40 lbs.
Brads	Assortment of various sizes	5 lbs.
Bolts	Carriage bolts	Assort.
Bolts	Lag bolts (screw)	Assort.
Bolts	Stove	Assort.
Nuts	Square	Assort.
Hinges	Various kinds and sizes	Assort.

ITEM	DESCRIPTION--------SIZE	NUMBER
Washers	Plain, various sizes	Assort.
Fasteners	Corrugated, various sizes	Assort.
Screws	Various sizes and kinds	Assort.
Paint remover	Paint and varnish remover	1 gal.
Turpentine	Turpentine or thiner	1 gal.
Paper	Sandpaper, various sizes	Assort.
Brushes	Paint brushes, various sizes	Assort.
Glue	Casein powder or casein base liquid	4 lbs.

Miscellaneous

Blades	Hack saw blades	12
Blades	Extras for power saws	Sev.
Blades	For horizontal power bandsaw, metal cutting	6
Handles	Extra handles for various tools	
Cloth	Emery cloth	
Wool	Steel wool	
Steel	Mild steel, flats and rounds, various sizes	Assort.

III. Explanatory Notes

1. Portable welding screens to shield welding area from rest of shop. These can be removed and stored to increase working space when welding is not being taught.

2. An exhaust system of movable, individual hoods should be used to remove smoke and fumes. This system can be extended and adapted to remove the exhaust fumes from the internal combustion engines used in these classes.

3. Compressed air should be available throughout the shop and work areas.
   (a) 1 quick-connect air outlet every 20' around the shop
   (b) 1 quick-connect air outlet in paved area

4. Water connections:
   (a) 1 hose connection inside shop near overhead door
   (b) 2 hose connections in concrete paved area for washing and steam cleaning operations

LABORATORY STORAGE

I. Tool room

1. Wall panels, bins or cainets for storage of special tools, tool sets, portable tools and other equipment
2. Tool room should be secured

II. Supplies storage

1. Can be included in the tool room if necessary
2. Bins and/or locked cabinets for consumable supplies and other specialized items

III. Overhead storage

1. Located above office, tool room, washroom and classroom areas if needed
2. Wall mounted and/or free standing racks for storage of lumber, steel and other large supplies
3. A ladder or stairway and a guard rail must be provided
4. In some instances the air compressor can be located in this area. Do not locate over classroom because of noise problems.

OUTSIDE PAVED AREA

1. The area outside of overhead door where washing and steam cleaning operations are carried out must be paved with concrete and supplied with adequate drains to carry off waste water. Asphalt must not be used in this area due to the fact that the asphalt will be broken up by the effects of grease, oil and steam. The remainder of the area can be paved with asphalt or concrete as desired.
2. Entire area should be fenced with 8' high chain link fence with one 16' wide gate and other gates as needed. Provisions should be made to secure area during out of school hours.
3. Loading ramp constructed of concrete, 4' high, 14' wide and at least a 4' x 14' level area at top, with a down slope of 4" per foot, length of slope will be determined by land topography where the ramp is constructed.

ELECTRICAL REQUIREMENTS

The section will outline in general terms the electrical requirements of the various areas of the facility.

1. Classroom
   (a) 1 - 110 v., 20 amps. polarized duplex outlet every 10' around classroom

2. Teacher office
    (a) 2 - 110 v., 20 amps. polarized duplex outlets

3. Classroom storage
    (a) 2 - 110 v., 20 amps. polarized duplex outlets

4. Library
    (a) 2 - 110 v., 20 amps. polarized duplex outlets

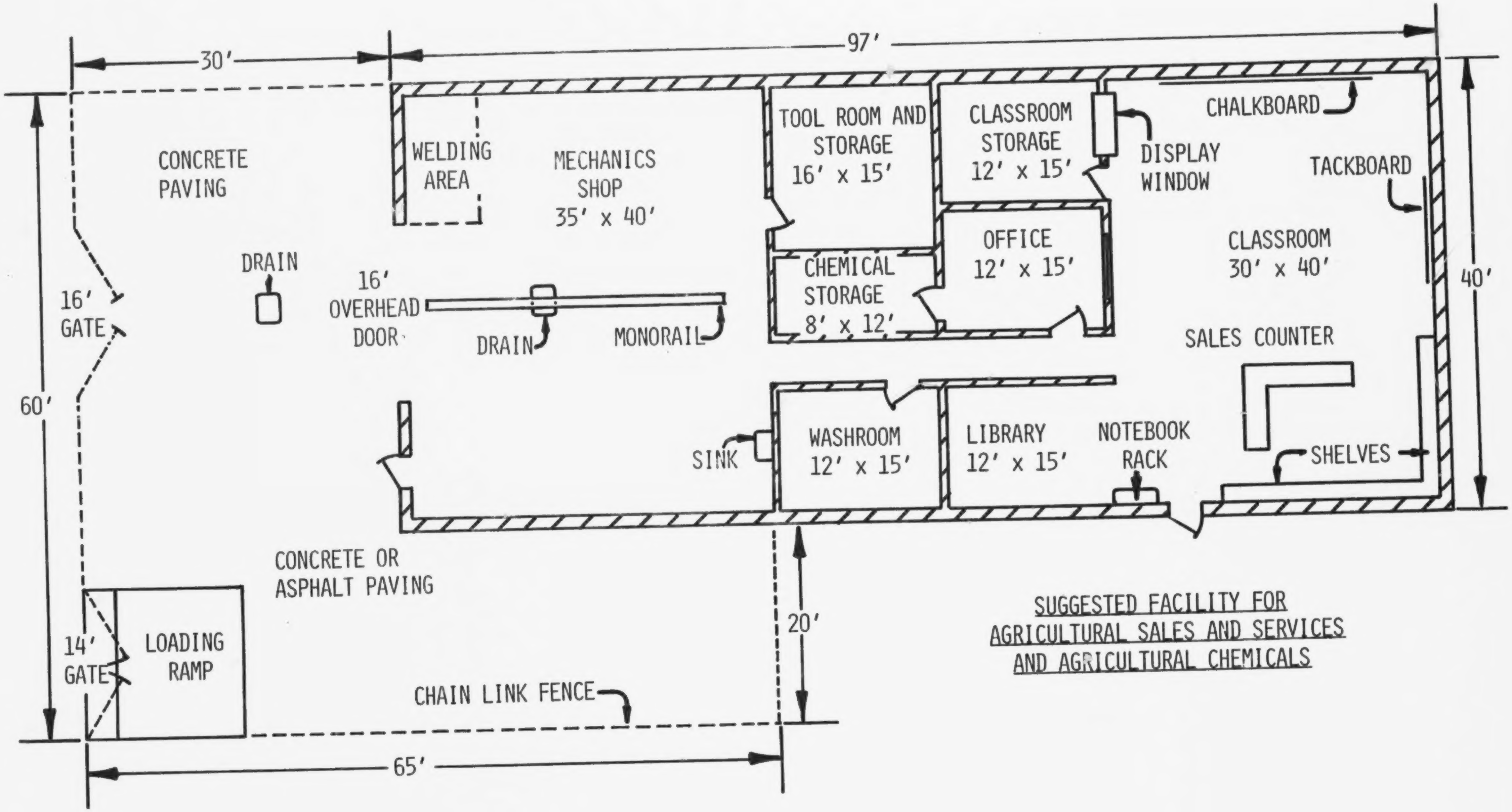
5. Mechanics laboratory
    (a) 1 - 110 v., 20 amps. polarized duplex outlet every 10' around laboratory area
    (b) 1 - 220 v., outlet every 10' around laboratory area
    (c) 4 - 220 v., welder outlets, 2 in welding area, 2 in other shop areas
    (d) 1 - Buss bar, in center running the length of the shop to allow for flexibility in locating stationary equipment and to provide adequate electrical power in all areas of the mechanics laboratory

6. Tool room
    (a) 1 - 110 v., 20 amps. polarized duplex outlet

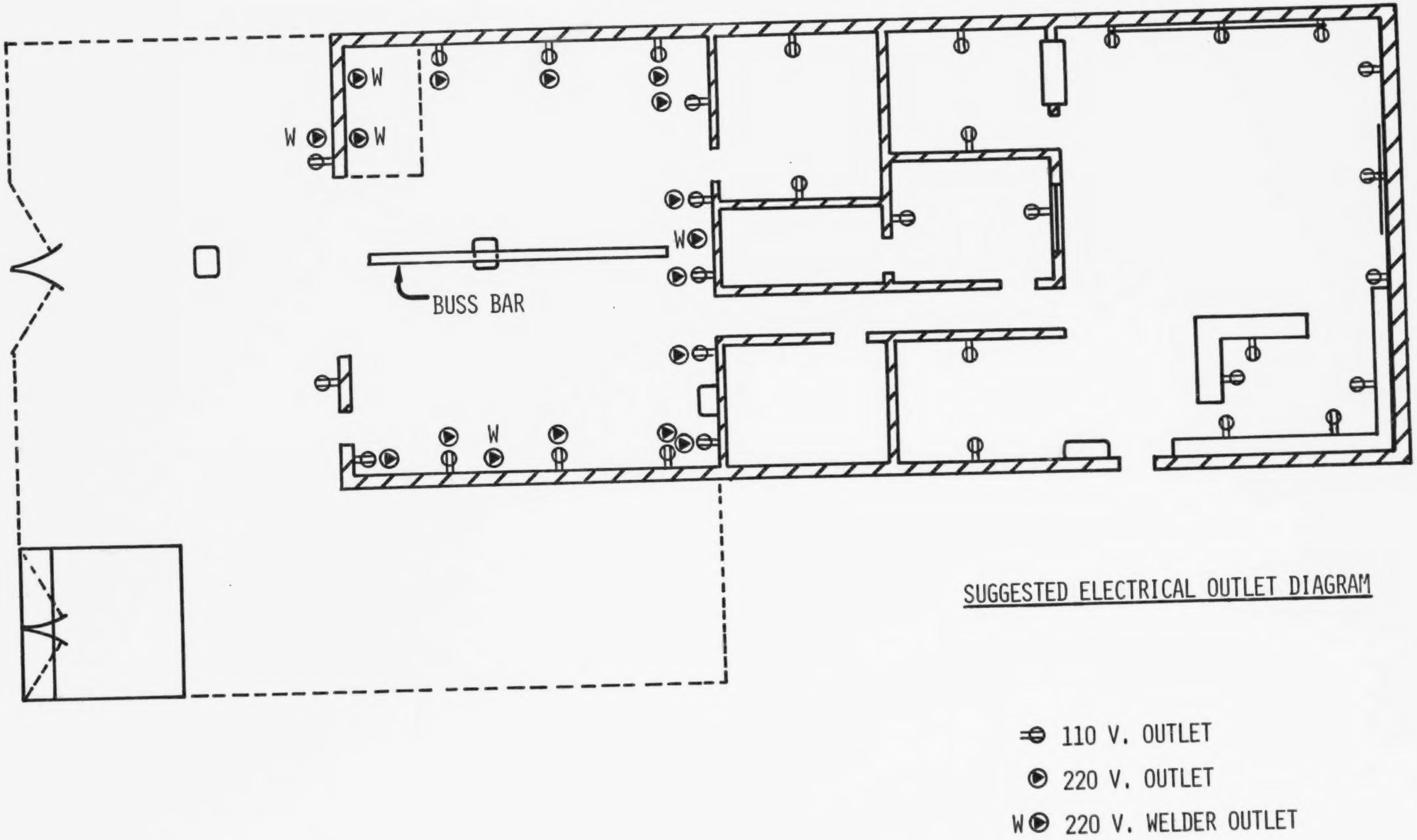
7. Outside paved area
    (a) 2 - 110 v., 20 amps. weatherproof polarized duplex outlets
    (b) 1 - 220 v., weatherproof welder outlet

SUGGESTED PLANS

The last part of this section consists of suggested floor plans for this agriculture facility. These plans include all areas previously outlined and contain details of certain sections for clarity. There is an electrical diagram consisting of the recommended numbers of outlets, size and location. Number, size and type of lighting will be determined by state specifications and will conform to the type selected for use in the remainder of the school building.


30′
97′
40′
60′
65′
20′
CONCRETE PAVING
WELDING AREA
MECHANICS SHOP 35′ x 40′
TOOL ROOM AND STORAGE 16′ x 15′
CLASSROOM STORAGE 12′ x 15′
DISPLAY WINDOW
CHALKBOARD
TACKBOARD
CLASSROOM 30′ x 40′
OFFICE 12′ x 15′
CHEMICAL STORAGE 8′ x 12′
DRAIN
16′ GATE
16′ OVERHEAD DOOR
DRAIN
MONORAIL
SALES COUNTER
SINK
WASHROOM 12′ x 15′
LIBRARY 12′ x 15′
NOTEBOOK RACK
SHELVES
CONCRETE OR ASPHALT PAVING
14′ GATE
LOADING RAMP
CHAIN LINK FENCE

SUGGESTED FACILITY FOR
AGRICULTURAL SALES AND SERVICES
AND AGRICULTURAL CHEMICALS


W
W
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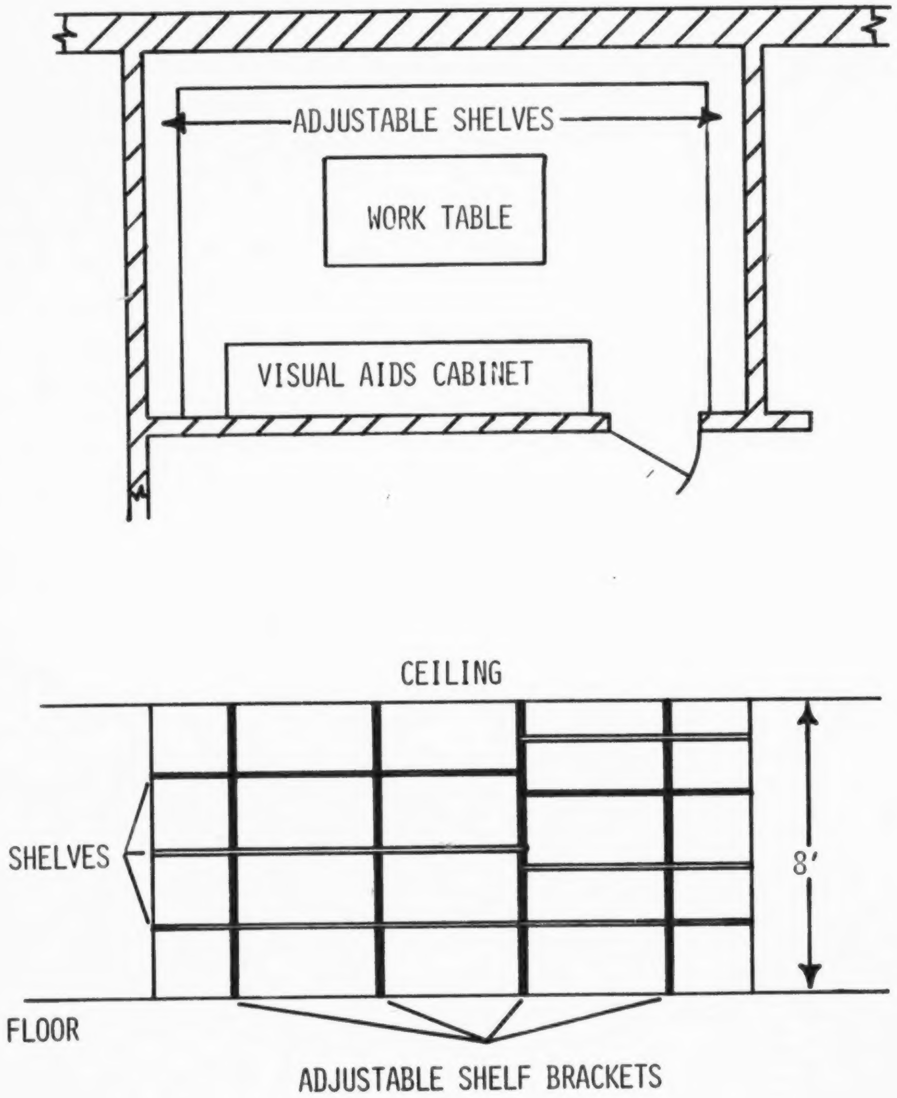
BUSS BAR
W
W
≑ 110 V. OUTLET
● 220 V. OUTLET
W● 220 V. WELDER OUTLET

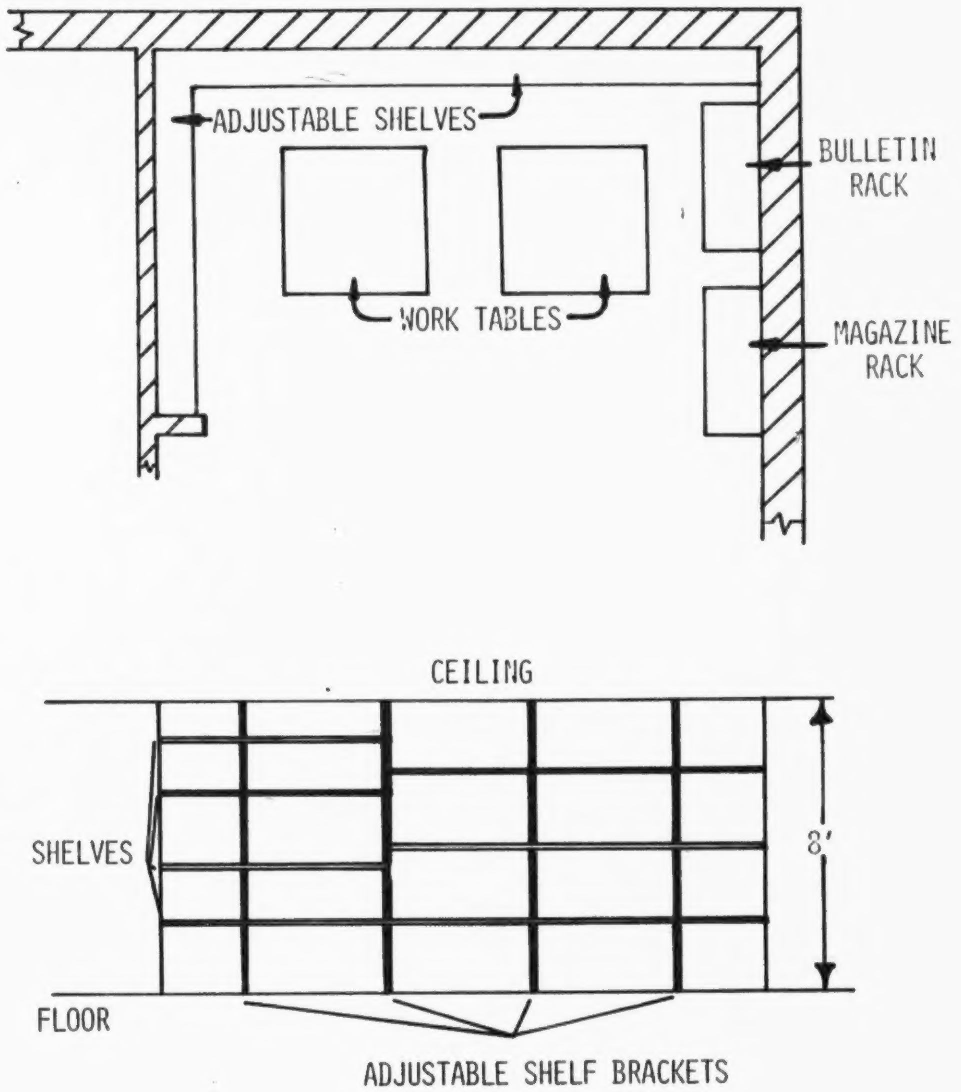
SUGGESTED ELECTRICAL OUTLET DIAGRAM

SUGGESTED ARRANGEMENT FOR CLASSROOM STORAGE AND LIBRARY

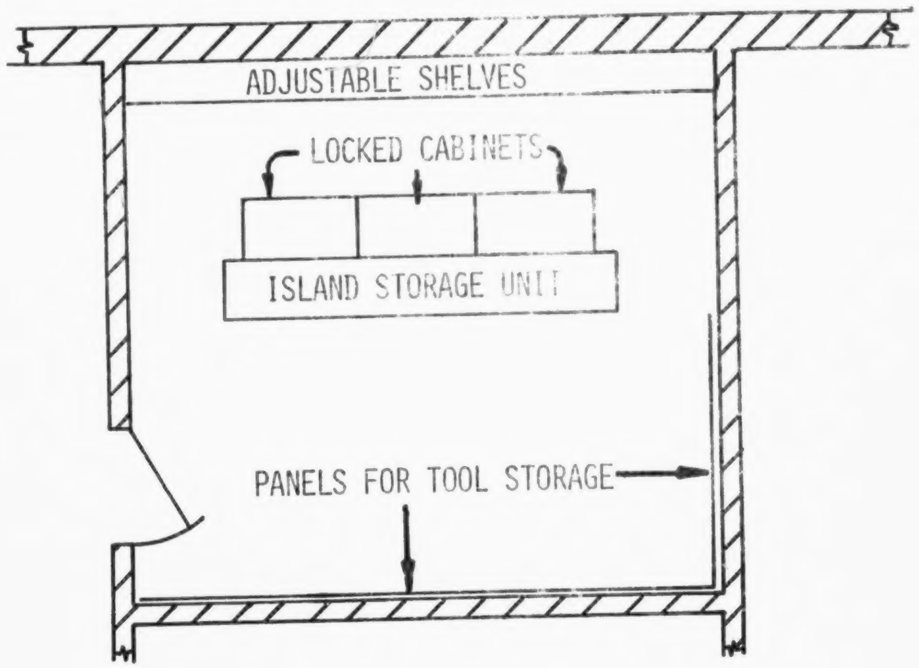
STORAGE

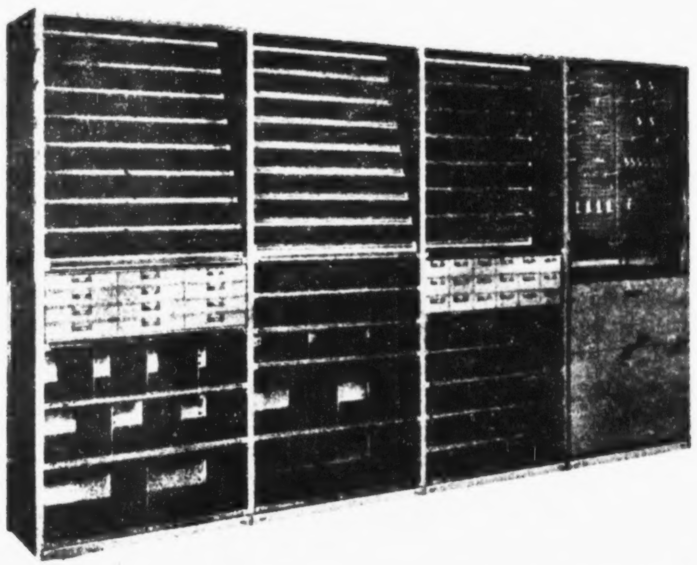

ADJUSTABLE SHELVES
WORK TABLE
VISUAL AIDS CABINET
CEILING
SHELVES
8′
FLOOR
ADJUSTABLE SHELF BRACKETS

LIBRARY

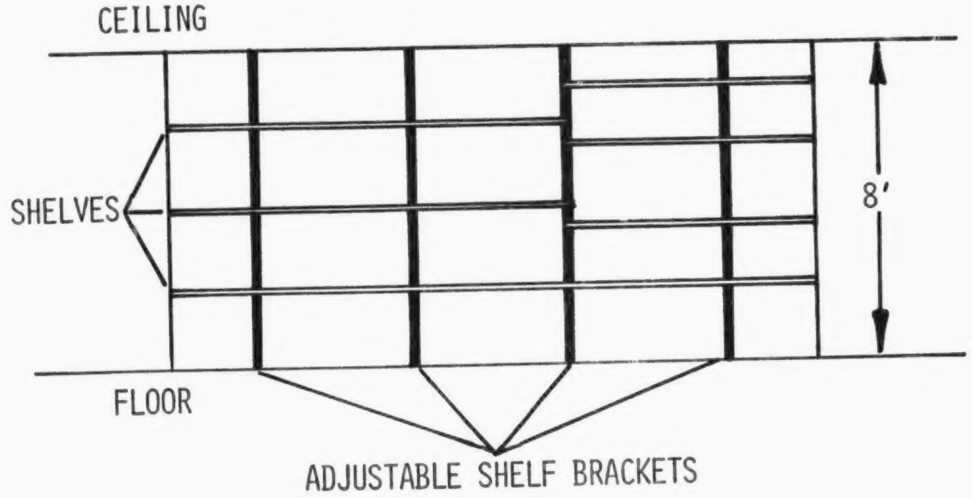

ADJUSTABLE SHELVES
BULLETIN RACK
WORK TABLES
MAGAZINE RACK
CEILING
SHELVES
8′
FLOOR
ADJUSTABLE SHELF BRACKETS

SUGGESTED ARRANGEMENT FOR SHOP STORAGE AND TOOLROOM

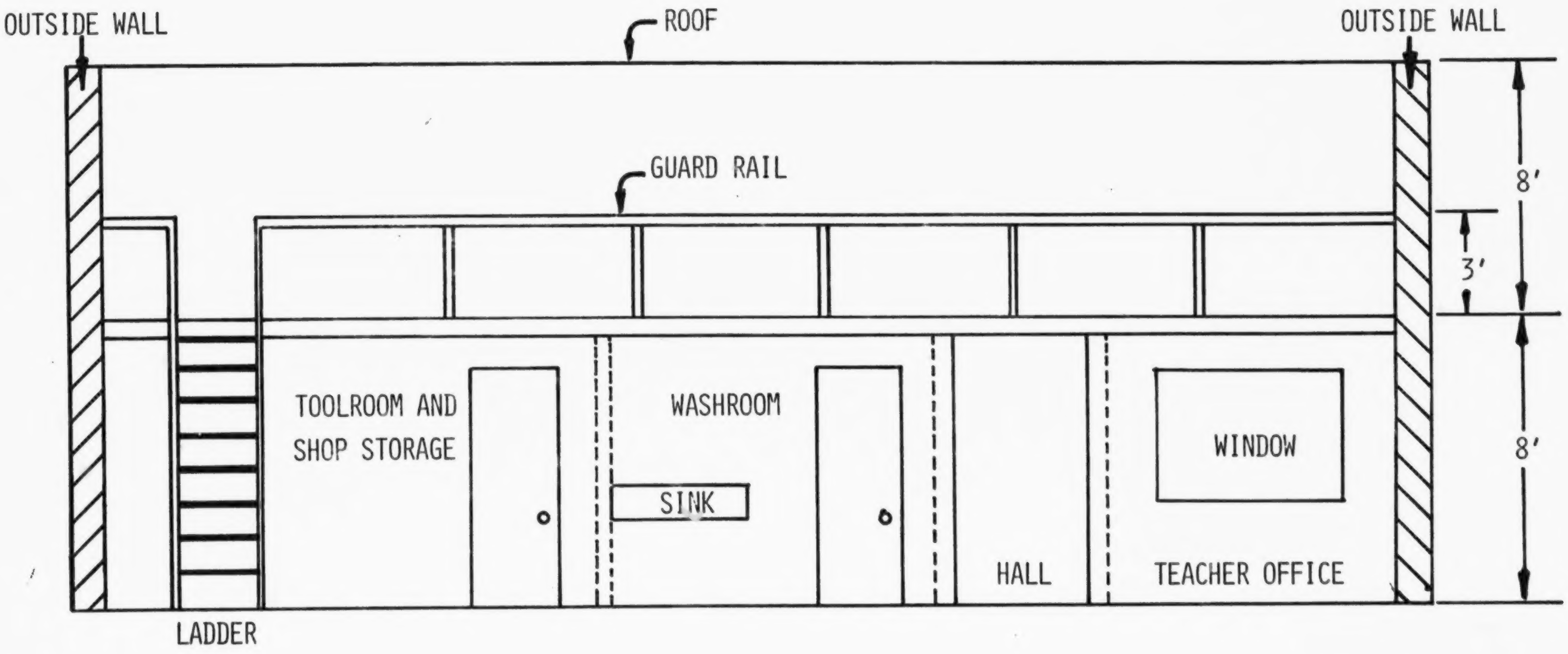

ADJUSTABLE SHELVES
LOCKED CABINETS
ISLAND STORAGE UNIT
PANELS FOR TOOL STORAGE



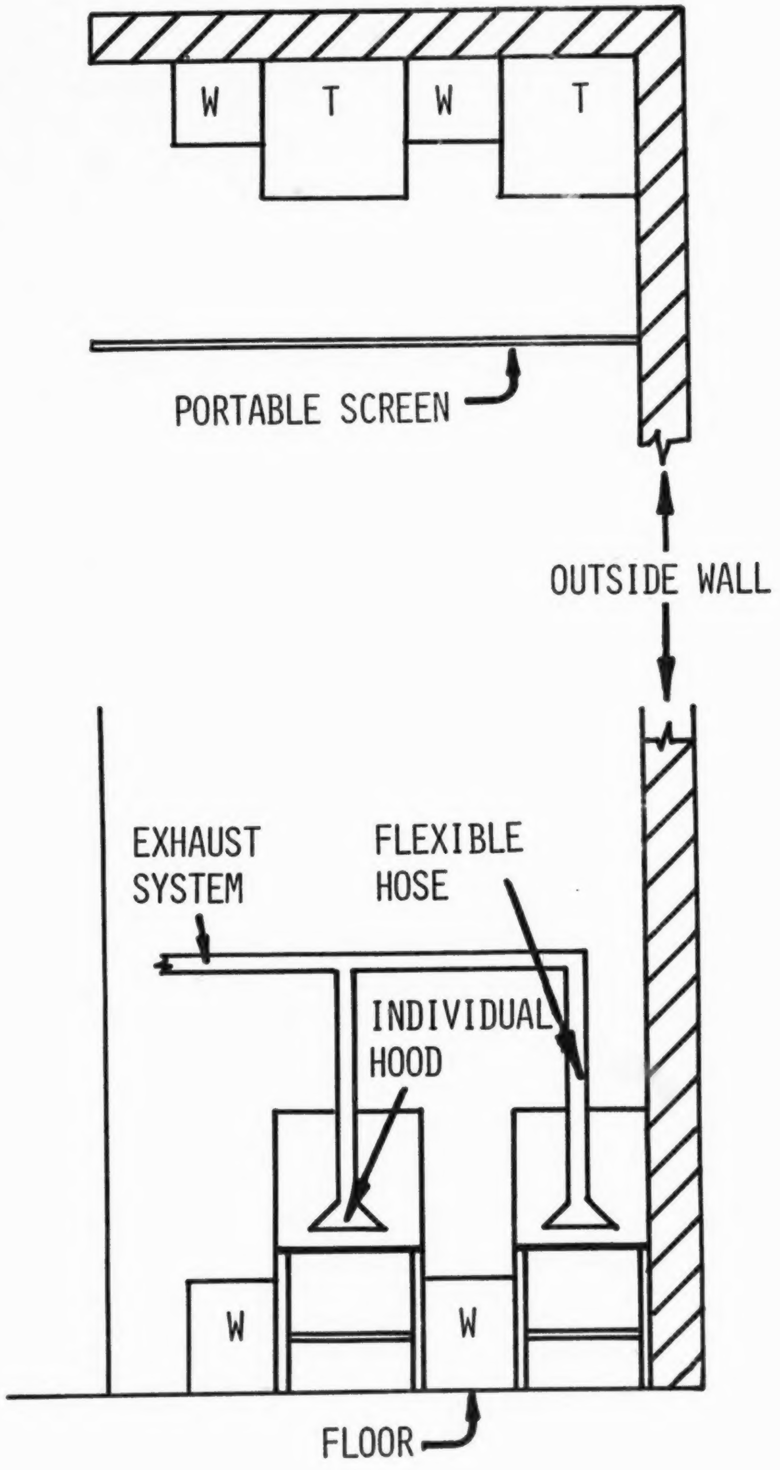
EXAMPLE OF ISLAND TYPE STORAGE UNIT


CEILING
SHELVES
8'
FLOOR
ADJUSTABLE SHELF BRACKETS

SUGGESTED OVERHEAD STORAGE


OUTSIDE WALL
ROOF
OUTSIDE WALL
GUARD RAIL
8′
3′
8′
TOOLROOM AND SHOP STORAGE
WASHROOM
SINK
HALL
WINDOW
TEACHER OFFICE
LADDER

SUGGESTED ARRANGEMENT FOR WELDING AREA


W
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PORTABLE SCREEN
OUTSIDE WALL
EXHAUST SYSTEM
FLEXIBLE HOSE
INDIVIDUAL HOOD
W
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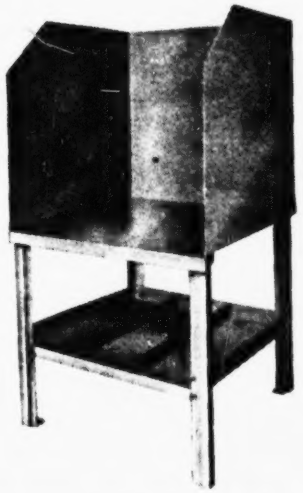
FLOOR



EXAMPLE OF TYPE OF WELDING TABLE

W-ARC WELDER
T-WELDING TABLE

SECTION 5 - LIVESTOCK MANAGEMENT

The livestock management facility is designed for the situation where it will be the only vocational agricultural educational curriculum taught in the school. The facility is based on the circumstance where there is only one teacher. In multiple teacher departments each teacher should have an individual office and where scheduling requires that each teacher meet a class during the same period, additional classroom facilities must be provided.

SPACE REQUIREMENTS

Facility Section	Recommended Area (sq. ft.)
Classroom	960-1050
Teacher office	150- 180
Classroom storage	150- 180
Library	150- 180
Laboratory and walk-in cooler	900-1100
Washroom	150- 180
Farm Area	
Barn	36' x 40'
Pens	30' x 30'
Shed	30' x 30'
Pastures	3 - 1 acre 2 - 5 acre

Total land required for livestock management curriculum, minimum 15 acres.

The following parts of this section will outline the equipment required for the various areas of the facility, some of the special requirements of the areas and a recommended list of tools and supplies.

CLASSROOM

I. Equipment

1. Tables and chairs, or arm chairs for projected class size
2. Laboratory table or desk at front for teacher with a sink and water connections
3. Chalkboard, 3 1/2' x 20' at front, 36" from floor to chalktray
4. Tackboard, 3 1/2' x 10' at side or rear of classroom near entrance door, 36" from floor to bottom of tackboard
5. Projection screen, daylight type, 70" x 70", ceiling mounted or wall mounted, 8'-10' from floor to top of screen, with bracket to adjust for keystone effect when used with the overhead projector

6. Each window equipped with shades, twi-nighter venetian blinds or blackout curtains so room can be darkened when using projection equipment

7. Notebook rack, to be of sufficient size to provide storage of all students' notebooks (one space per student enrolled in the curriculum)

II. Audio-Visual Equipment

1. Projection table
2. Overhead projector with projection table
3. Slide and film strip projector
4. Tape recorder
5. 35 mm camera
6. The following items to be provided if they are not readily available for use from the school visual aids or library department
   (a) 16 mm movie projector
   (b) Super 8 mm movie projector for film loops
   (c) Opaque projector

III. Tools, Equipment and Supplies

CLASSROOM

ITEM	DESCRIPTION-------SIZE	NUMBER
Cabinet	Slide and filmstrip storage	1
Aids	Slides, strips, transparencies	Collection
Chart files	For large charts	1
Viewer	For slides and filmstrips	1
Loud speaker	Portable	1
Heating plate	Gas or electric	1
Microscope	Teaching, revolving	1
Scale	Utility, 60 pounds	1
Scale	Hanging, 100-300 pounds	1
Beakers, graduated cylinders, evaporating dish test tubes, mortar and pestle, glass tubing, flasks		Assort.
Lab manifier	Double lens	1

LIVESTOCK AREA

ITEM	DESCRIPTION---------SIZE	NUMBER
Charts, agricultural	Internal organs of cow, 30 x 40	1
	Internal organs of hog, 30 x 40	1
	Parts of dairy cow, 30 x 40	1
	Nitrogen cycle, 30 x 40	1
Hog models	Set of five hog grade models	1
Hog exhibit	Life history of hog roundworm	1
Thermometer	Clinical thermometer	1
Cattle leader	Cattle nose leader	1
Hoof parer	14" long	1
Hoof nipper	14" long	1
Hoof knife	Searcher knife (right or left hand)	1
Emasculator	13" to 16"	1
Ear tag pliers	Applicator for cattle ear tags	1
Hog holder		1
Hog ringer	Automatic	1
Foot bath	Sanitary foot bath	1
Branding	Freeze branding - 4" numbers	1 set
Chute & scales	Squeeze chute & scales combination	1

BEEF CATTLE EQUIPMENT

Sticks	Show	12
Knife		1
Dehorner	Electric	1
Syringes	Vaccination	12
Tatto	3/8" letter	1 set
Gun	Balling	1
Rasp	Hoof	4
Chisel	Hoof	2
Comb	Spring, curry	12
Rasp	Horn	2
Feeder	Creep	2
Bucket	Galvanized, 10 qt.	4
Box	Mineral	4
Clippers	Electric	2
Chains	Neck chains and numbers	12
Fan	Electric, 12"	2
Truck	1/2 ton, with cattle frames	1
Fork	Pitch	2
Shovel		2

ITEM	DESCRIPTION---------SIZE	NUMBER
Hose	3/4" rubber, with nozzle, 50'	2
Waterer	Automatic	5
Stretcher	Wire	1
Saw	Meat	1
Knives	Meat cutting	1 set
Grinder	Meat, electric	1
Trough	Feed	2

BEEF CATTLE SUPPLIES

Halter	Rope	12
Halter	Leather	4
Brush		6
Combs	Scratch	6
Needles	Vaccination	36
Cattle	Wormer (Thibenzdate)	100
Boots	Rubber	6 pr.
Apron	Rubber	6
Paper	Sand, fine	24
Cloth	Emory, fine	24
Rotenone		10 lbs.
Rubs	Back	2
Feed	Cattle	as needed

SWINE EQUIPMENT

Sticks	Show	12
Ringer	Hog	1
Marker	Ear	1
Syringe	Vaccination	12
Stick	Livestock, Electric	1
Hurdles	6' x 36" high	4
Bucket	Feed	4
Bucket	Water	4
Trough	Feed (rubber)	6
Fan	Electric, 12"	2
Holder	Hog	2
Probe	Backfat	1
Feeder	Self, wood--outdoor	3
Feeder	Creep	3

ITEM	DESCRIPTION-------SIZE	NUMBER
Brooder	Infra-red with bulbs	4
Scales	Hand	1
Shovel	Large	2
Shovel	Small flat	2
Fork	Shavings	2
Hose	3/4" rubber, 50', with nozzle	1
Hydrant	Frost free	6
Waterer	Automatic	6
Barrow	Wheel	1
Digger	Post hole	1

SWINE SUPPLIES

Rings	Hog	4 boxes
Brush		12
Needles	Vaccination	12
Wormer	Pig (Piperozine)	2 gal.
Boots	Rubber	6 pr.
Apron	Rubber	6
Oil	Mineral	1 gal.
Dust	Lindane 1%	25 lbs.
Broom	Floor	4
Kerosene		5 gal.
Feed		as needed

AGRICULTURAL MECHANICS MAINTENANCE TOOLS

Saw	Crosscut, 26"	1
Saw	Rip, 26"	1
Hammer	Claw	1
Screwdrivers	Regular blade	1 set
Screwdrivers	Phillips	1 set
Drill	Electric, 1/4"	1
Bits	For electric drill, wood, steel and masonry types	1 set ea.
Bar	Wrecking, 24"	1
Bar	Crow	1
Shovel	Round point, long handle	1
Mattock		1
Saw	Saber, electric	1
Punch	Punch and chisel set	1

ITEM	DESCRIPTION------SIZE	NUMBER
Wrench	Pipe, 12", 18", 24"	3
Wrench	Box end, 1/4"-1" by 16ths	1 set
Wrench	Open end, 1/4"-1" by 16ths	1 set
Wrench	1/2" drive, socket set, complete	1 set
Hammer	Sledge, 10 lbs.	1
Hammer	Ball peen	1
Torch	Soldering	1
Snips	Tinners	1
Cord	Extension, 50'	1

TEACHER OFFICE

I. Equipment

1. Office desk, steel, 3 drawers on one side and single drawer and file drawer on other side, with a large center drawer
2. Desk chair with casters, padded seat and back
3. Telephone
4. Adding machine
5. Typewriter with portable table
6. Two side chairs
7. Bookcase
8. 2-4 drawer steel filing cabinets

II. Teacher Office Supplies

Punch	Hand-hole punch	1
Guide	Lettering guide	1
Pens	Lettering (marking) pens 1/8" and 1/4"	2

CLASSROOM STORAGE AREA

1. Adjustable shelves on three walls for storage of teaching materials and supplies.
2. Large cabinet for storage of audio-visual equipment and other teaching materials such as charts, graphs, films, etc.

3. Table, approx. 3' x 6' x 30", for set up and testing of visual aids equipment

LIBRARY

1. Library tables and chairs for students using the library area
2. Adjustable shelves on walls for storage of student reference materials
3. Magazine rack
4. Bulletin storage cabinet or rack

WASHROOM

Commodes, urinals and sinks as needed. The space requirements will vary according to the numbers of students enrolled and the availibility of other sanitary facilities in the school.

LABORATORY AND WALK-IN COOLER

The laboratory is located adjacent to the classroom and office with direct access to the walk-in cooler. It should have a large, 12' x 10', overhead door, the walls should be tiled for ease of cleaning and there should be a center drain in floor with the floor properly sloped for drainage. A monorail should lead from the overhead door through the laboratory and into the cooler.

I. Laboratory Equipment

1. Large stainless steel sink
2. Household type refrigerator
3. Metal storage cabinet
4. Monorail with carrier for meat carcasses
5. Work table, meat block type
6. 3 1/2' x 10', chalkboard

II. Cooler Equipment

Meat hooks and racks for meat storage

FARM AREAS

The barn should be of concrete block construction and include the following areas:

1. Office
2. Storage and maintenance area
3. Two feed storage areas
4. One box stall for beef animals
5. Two farrowing pens
6. Squeeze chute
7. Loading ramp
8. Set of scales
9. Stock table

Adjacent to the barn area there should be three holding pens, a shed for feeder cattle and one large open holding pen (approximately 1 acre in size). In addition there should be the following pasture areas: one 1/2 acre and three 1 acre lots for swine and two 5 acre pastures for beef animals.

All pasture areas should be fenced with treated posts set 10 feet apart with 32 inch woven wire fencing with one strand of barb wire on the bottom for swine and 47 inch woven wire fencing with one strand of barb wire on top for beef cattle.

Hay storage should be provided in a separate building; if so placed it can be a self feeding type structure. If needed, hay racks should be provided for the beef cattle.

The total facility is designed for 5 brood cows and 3 sows and will require at least 15 acres of land.

Sanitation must be controlled carefully and be as automated as possible. The sanitation system used must meet state health requirements and be of such a type as not to present undesirable problems to the remainder of the school plant.

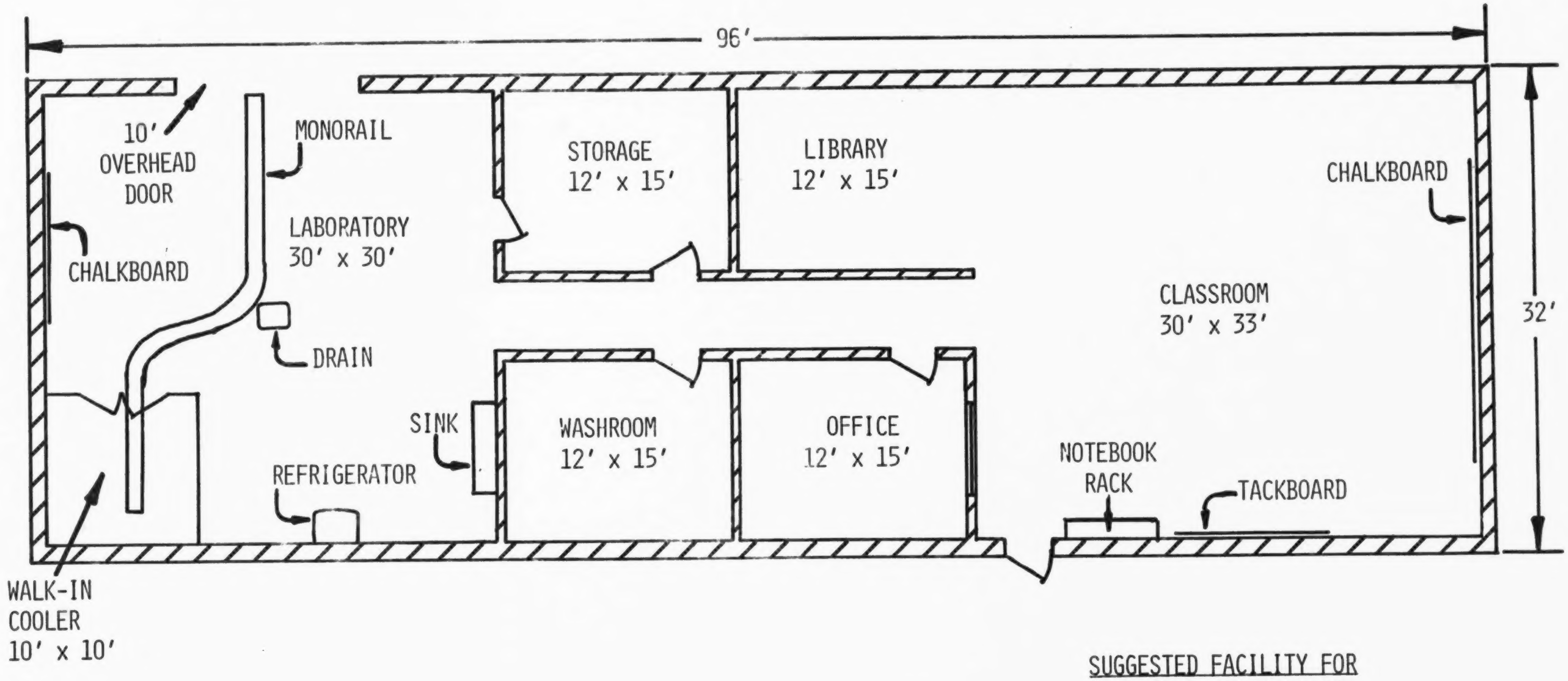
ELECTRICAL REQUIREMENTS

The section will outline in general terms the electrical requirements of the various areas of the facility.

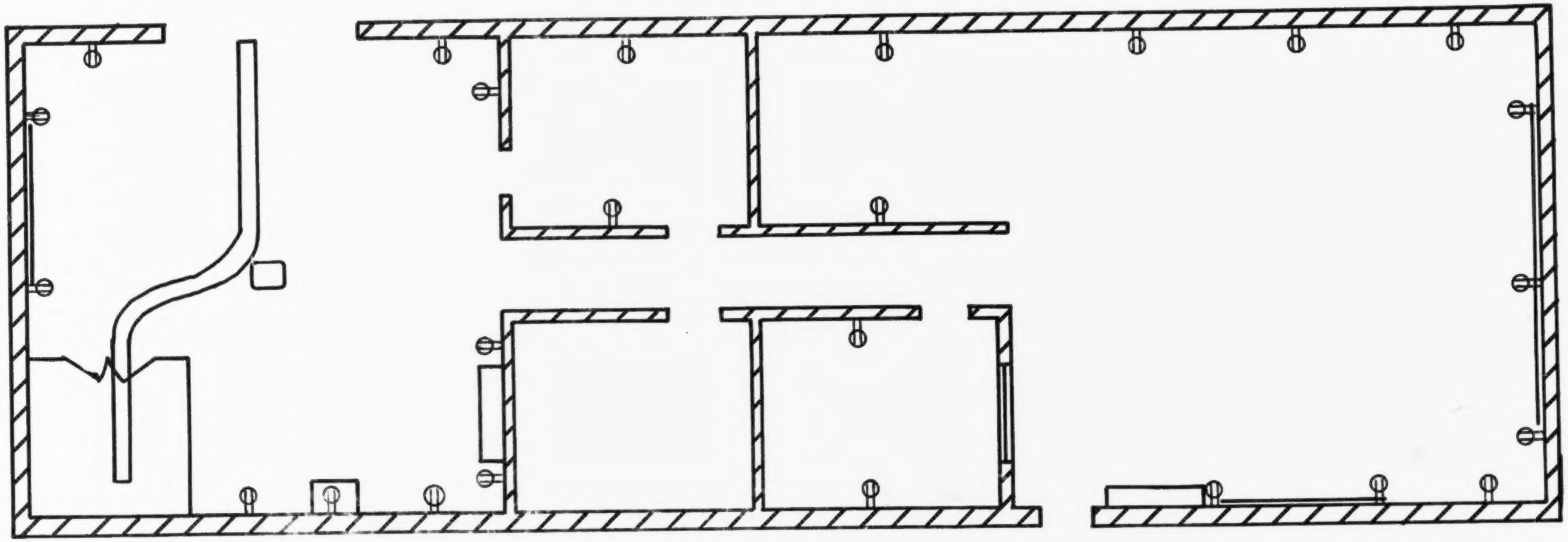
1. Classroom
    (a) 1 - 110 v., 20 amps. polarized duplex outlet every 10' around classroom
2. Teacher office
    (a) 2 - 110 v., 20 amps. polarized duplex outlets
3. Classroom storage
    (a) 2 - 110 v., 20 amps. polarized duplex outlets
4. Library
    (a) 2 - 110 v., 20 amps. polarized duplex outlets
5. Laboratory
    (a) 1 - 110 v., 20 amps. polarized duplex outlet every 10' around laboratory
6. Barn
    (a) 1 - 110 v., 20 amps. polarized duplex outlet in each barn area
    (b) 1 - 220 v., welder outlet near storage and maintenance area
    (c) Power as required to operate appropriate materials handling equipment, i.e., barn cleaner, elevators, etc.

SUGGESTED PLANS

The last part of this section consists of suggested floor plans for this facility. These plans include all areas previously outlined and contain details of certain sections for clarity. There is an electrical diagram consisting of the recommended numbers of outlets, size and location. Number size and type of lighting will be determined by state specifications and will conform to the type selected for use in the remainder of the school building.


96′
32′
10′ OVERHEAD DOOR
MONORAIL
CHALKBOARD
LABORATORY 30′ x 30′
DRAIN
SINK
REFRIGERATOR
WALK-IN COOLER 10′ x 10′
STORAGE 12′ x 15′
LIBRARY 12′ x 15′
WASHROOM 12′ x 15′
OFFICE 12′ x 15′
CLASSROOM 30′ x 33′
CHALKBOARD
NOTEBOOK RACK
TACKBOARD

SUGGESTED FACILITY FOR LIVESTOCK MANAGEMENT

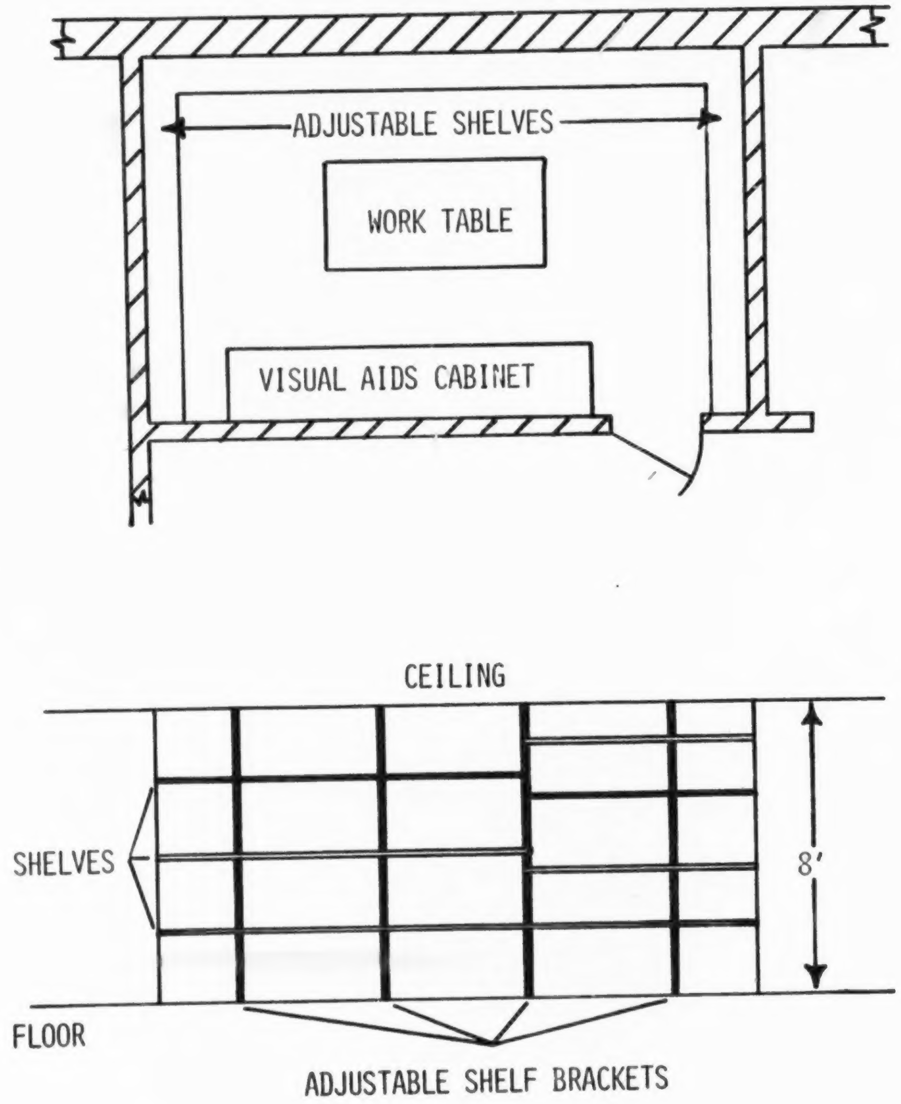


SUGGESTED ELECTRIAL OUTLET DIAGRAM

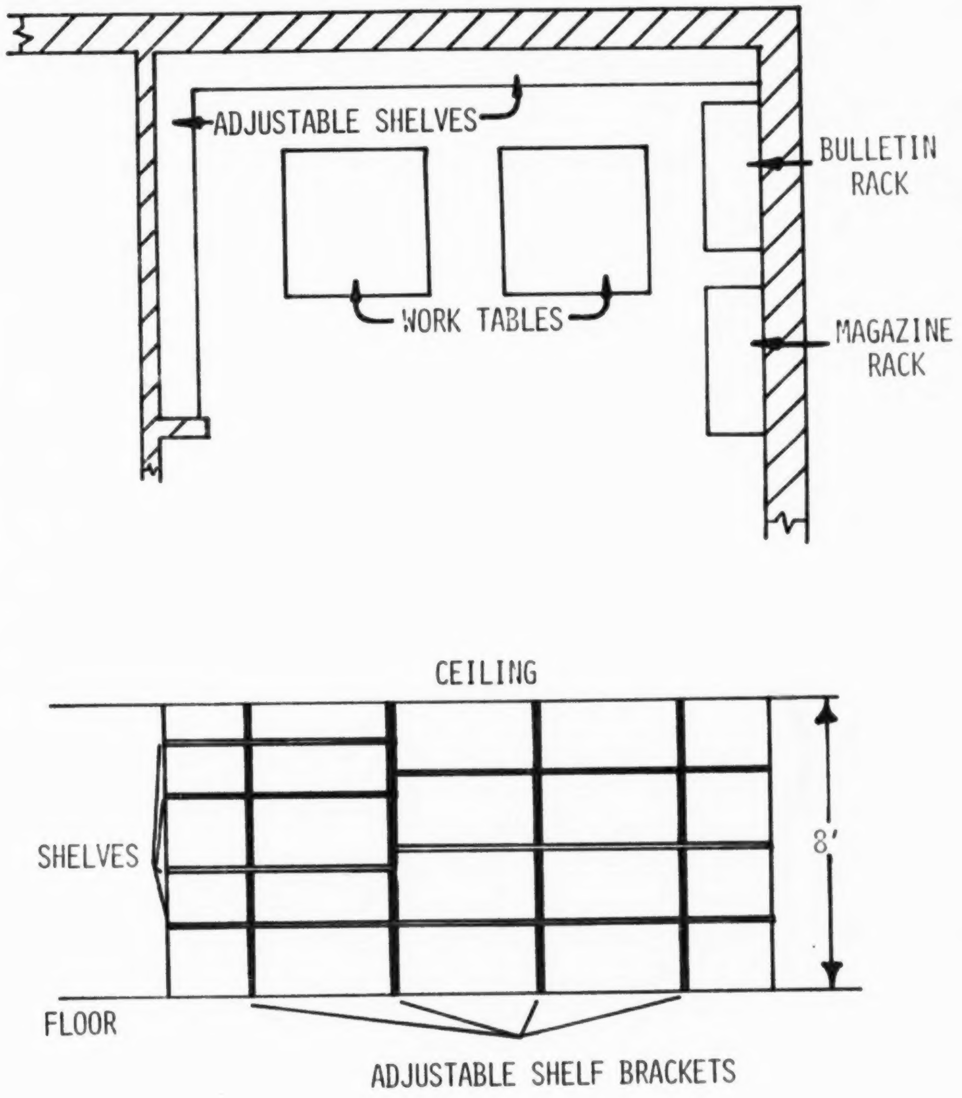
⊖ 110 V. OUTLET

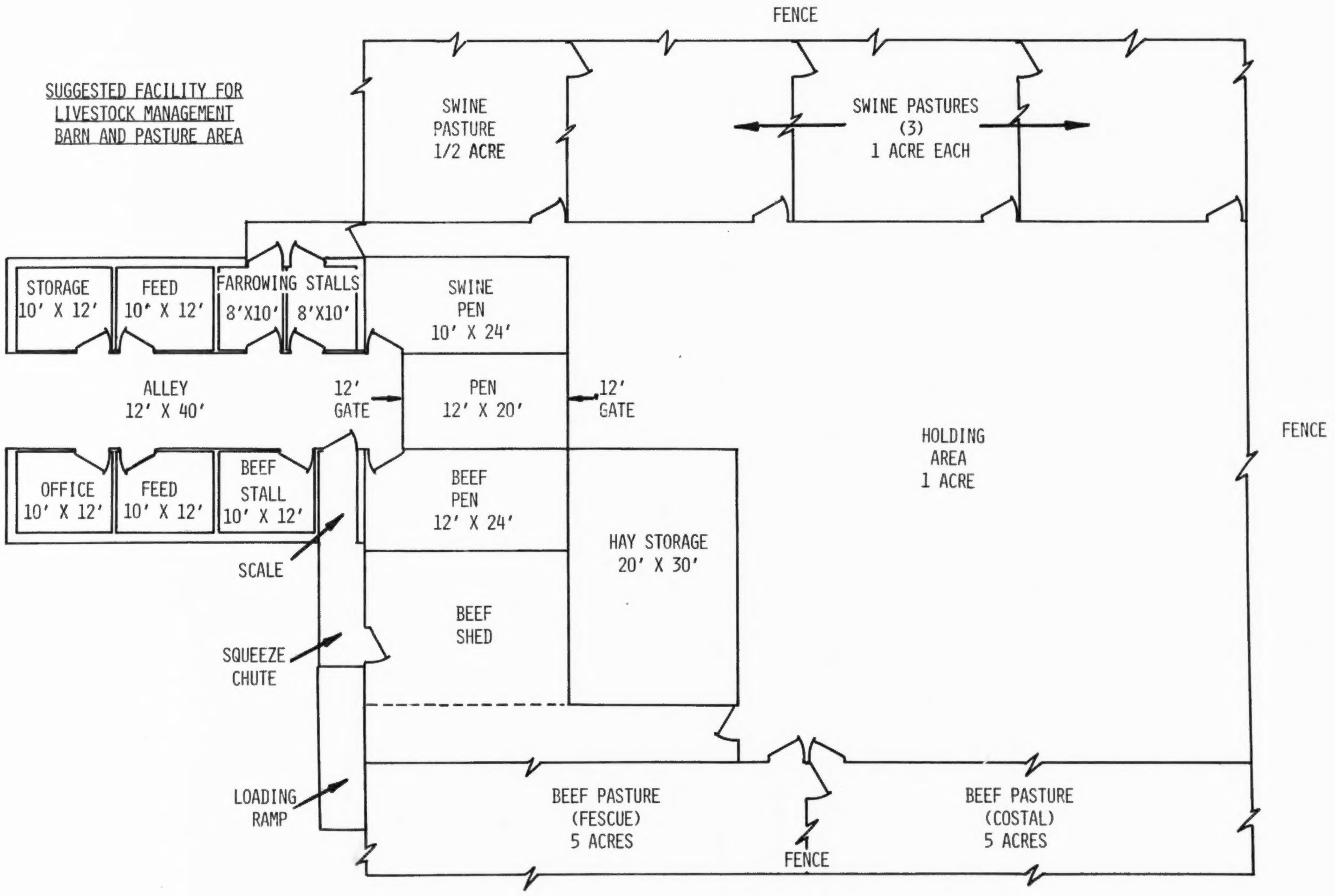
SUGGESTED ARRANGEMENT FOR CLASSROOM STORAGE AND LIBRARY

STORAGE


ADJUSTABLE SHELVES
WORK TABLE
VISUAL AIDS CABINET
CEILING
SHELVES
8'
FLOOR
ADJUSTABLE SHELF BRACKETS

LIBRARY


ADJUSTABLE SHELVES
BULLETIN RACK
WORK TABLES
MAGAZINE RACK
CEILING
SHELVES
8'
FLOOR
ADJUSTABLE SHELF BRACKETS



SUGGESTED FACILITY FOR LIVESTOCK MANAGEMENT BARN AND PASTURE AREA

FENCE
SWINE PASTURE
1/2 ACRE
SWINE PASTURES
(3)
1 ACRE EACH
STORAGE
10' X 12'
FEED
10' X 12'
FARROWING STALLS
8'X10'
8'X10'
SWINE
PEN
10' X 24'
ALLEY
12' X 40'
12'
GATE
PEN
12' X 20'
12'
GATE
HOLDING
AREA
1 ACRE
FENCE
OFFICE
10' X 12'
FEED
10' X 12'
BEEF
STALL
10' X 12'
BEEF
PEN
12' X 24'
HAY STORAGE
20' X 30'
SCALE
BEEF
SHED
SQUEEZE
CHUTE
LOADING
RAMP
BEEF PASTURE
(FESCUE)
5 ACRES
FENCE
BEEF PASTURE
(COSTAL)
5 ACRES

SECTION 6 - FORESTRY AND PULPWOOD PRODUCTION

The forestry and pulpwood production facility is designed for the situcation where they will be the only vocational agricultural educational curriculums taught in the school. The facility is based on the circumstance where there is only one teacher. In multiple teacher departments each teacher should have an individual office and where scheduling requires that each teacher meet a class during the same period, additional classroom facilities must be provided.

SPACE REQUIREMENTS

Facility Section	Recommended area (sq. ft.)
Classroom	960-1050
Teacher office	150- 180
Classroom storage	150- 180
Library	150- 180
Washroom	100- 150
Laboratory	800-1000
Laboratory storage	
Tool room	150- 180
Supplies storage	50- 75
Paved area	2400-3000

The following parts of this section will outline the equipment required for the various areas of the facility, some of the special requirements of the areas and a recommended list of tools and supplies.

CLASSROOM

I. Equipment

1. Tables and chairs, or arm chairs for projected class size
2. Laboratory table or desk at front the teacher with a sink and water connections
3. Chalkboard, 3 1/2' x 20' at front, 36" from floor to chalktray
4. Tackboard, 3 1/2' x 10' at side or rear of classroom near entrance door, 36" from floor to bottom of tackboard
5. Projection screen, daylight type, 70" x 70", ceiling mounted or wall mounted 8'-10' from floor to top of screen, with bracket to adjust for keystone effect when used with the overhead projector.
6. Each window equipped with shades, twi-nighter venetian blinds or blackout curtains so room can be darkened when using projection equipment.

7. Notebook rack, to be of sufficient size to provide storage of all students' notebooks (one space per student enrolled in the curriculum)

II. Audio-Visual Equipment

1. Projection table
2. Overhead projector with projection table
3. Slide and film strip projector
4. Tape recorder
5. 35 mm camera
6. The following items to be provided if they are not readily available for use from the school visual aids or library department:
   (a) 16 mm movie projector
   (b) Super 8 mm movie projector for film loops
   (c) Opaque projector

III. Tools, Equipment and Supplies

CLASSROOM

ITEM	DESCRIPTION-------SIZE	NUMBER
Cabinet	Slide and filmstrip storage	1
Aids	Slides, strips, transparencies	Collection
Chart files	For large charts	1
Viewer	For slides and filmstrips	1
Loud speaker	Portable	1
Heating plate	Gas or electric	1
Microscope	Teaching, revolving	1
Scale	Utility, 60 pounds	1
Scale	Hanging, 100-300 pounds	1
Beakers, graduated cylinders, evaporating dish, test tubes, mortar and pestle, glass tubing, flasks		Assort.
Lab magnifier	Double lens	1
Altimeter	(Blume-Leiss or Haga)	5
Tape	Diameter (Atisan)	5
Compass	(Silva Ranger)	5
Clinometer		5
Book		5
Gauge	Basal Area Angle	2
Tape	Chain (Michigan) 100 links	5
Stereoscope	(Zeiss)	5

ITEM	DESCRIPTION-------SIZE	NUMBER
Rule	Log (Doyle)	5
Scale	Acreage	5
Axe	(Sager)	5
Goggles	(Eyeshields)	1 per student
Cap	Blue (Fiber glass)	1 per student
Saw	Chain, heavy duty	1
Saw	Chain, light duty	1
Tape	Steel, wind up	1
Injector	Tree (Revel)	1
Gun	Marking (Devilbiso - Pin stream or spray nozzle)	1
Box	Tool (Warden)	
Gauge	Bark (Swedish)	1
Saw	Bow	4
Hook	Bush (Double blade)	1
Caliper	Wood	1
Stick	Cruiser	1
Board	Drawing	6
Torch	Drip (Sealtite)	1
Rake	Fire	4
Swatter	Fire	4
Borer	Increment, 12 inch, (Swedish)	2
Pump	Fire-Compression spray, 3 1/2 gal.	2
Stick	Tree and log scale (Doyle)	2
Scale	Triangle (R & H)	6
Dibbles		5
Planter	Tree	1

CONSUMABLE SUPPLIES

Protractor	Ruler	5
Table	Volume	27
Cards	Tally	5 (100 ea.)
Killer	Weed (2-4-5T, etc.)	as needed
Oil	Fuel	20 gal.
BHC		5-20 lbs.
Paint	Tree marking	1 gal.
Repellant	Insect	4 pts.
Files	Flat and saw	36
Fuel	Diesel and gasoline for equipment	as needed
Insurance	Heavy equipment (Borrowed)	variable

TEACHER OFFICE

I. Equipment

1. Office desk, steel, 3 drawers on one side and single drawer and file drawer on other side, with a large center drawer
2. Desk chair with casters, padded seat and back
3. Telephone
4. Adding machine
5. Typewriter with portable table
6. Two side chairs
7. Bookcase
8. 2-4 drawer steel filing cabinets

II. Teacher Office Supplies

ITEM	DESCRIPTION----------SIZE	NUMBER
Punch	Hand-hole punch	1
Guide	Lettering guide	1
Pens	Lettering (Marking) pens 1/8" and 1/4"	2

CLASSROOM STORAGE AREA

1. Adjustable shelves on three walls for storage of teaching materials and supplies
2. Large cabinet for storage of audio-visual equipment and other teaching materials such as charts, graphs, films, etc.
3. Table, approx. 3' x 6' x 30", for set up and testing of visual aids equipment

LIBRARY

1. Library tables and chairs for students using the library area
2. Adjustable shelves on walls for storage of student reference materials
3. Magazine rack
4. Bulletin storage cabinet or rack

WASHROOM

Commodes, urinals and sinks as needed. The space requirements will vary according to the numbers of students enrolled and the availability of other sanitary facilities in the school.

MECHANICS LABORATORY

The mechanics laboratory should have one large service door leading to the outside paved area, size 14' high x 16' wide. There should be a small 36" door along side the large service door leading to outside paved area. Direct access from classroom and teacher office is desirable. At least one floor drain should be provided near center of open work space with concrete floor adequately sloped for proper drainage.

The welding area should be shielded from the remainder of the shop and contain adequate ventilation to remove the smoke and fumes created by the welding process.

The air compressor should be permanently located with quick-connect outlets every 20' around the shop on the walls.

A sink for student clean up should be provided in the laboratory area.

MECHANICS LABORATORY EQUIPMENT

ITEM	DESCRIPTION--------SIZE	NUMBER
Bandsaw	Horizontal, metal cutting, 8" capacity, 1 hp	1
Bench	Work, 2 man.	as needed
Bench	Work, 4 man.	as needed
Cleaner	Steam, Jenny IIC or equilivant	1
Compressor	Air, 8-120 psi, 7.9 cu. ft. displacement, 60 gal. tank, heavy duty, with oil and water extractor	1
Grinder	Pedestal, 10", heavy duty, 1 hp	1
Hoist	Chain, 2 ton capacity	1
Monorail	3 ton capacity	1
Press	Drill, woodworking, 15", heavy duty, 1/2 hp	1
Saw	Radial arm, 12", heavy duty, 3 hp	1
Welder	Arc, 220 v., 20% duty cycle	2
Welder	Oxyacetylene, medium duty	1

AGRICULTURAL MECHANICS AREA

ITEM	DESCRIPTION--------SIZE	NUMBER

Woodwork and Carpentry

Tools in this section are for a small working group, three to five students, and are to be placed in a woodworking cabinet. One cabinet for every three or four students is desirable.

Brace	Ratchet, 10" swing	1
Bits	Auger, 1/4"-1" by eights	set
Bit	Countersink, rosehead - 3/4" x 5"	1
Chisels	Wood, heavy duty, - 1/4"-1" by 1/4 ths	set
Drawknife	10" blade	1
Hammer	Bell faced, 16 ounces	1
Bar	Wrecking, gooseneck, 18"	1
Plane	Smoothing, 10"	1
Plane	Block, 6"	1
Saw	Hand, crosscut, 26" (8 or 10 points)	1
Saw	Coping, 6 1/2" blade	1
Saw	Keyhole (10 points)	1
Square	Framing 16" x 24"	1
Square	Sliding T-bevel 10"	1
Square	Combination, 12"	1
Screwdrivers	Set of bits, 1/4", 5/16", 3/8"	set
Screwdrivers	Set shockproof, 6", 8", 10"	set
Screwdrivers	Phillips, 6", 8", 10"	set
Files	Mill files, 6", 8", 10"	set
Files	Wood rasp, 12"	1
Scraper	Wood, 3" blade	1
Oilstones	Combination, 6" x 2"	1
Mallet	Carpenter's, 16 ounces	1
Knife	Putty	1

Woodwork and Carpentry

Tools in this section should be placed in the central of general tool room.

Bits	Electrician's 1/4", 1/2", 3/4"	set
Bits	Expansion, 7/8"-3"	set
Bits	Extension, 15"	1
Clamps	Adjustable bar, 3"-8"	2
Clamps	"C" Clamps, 5" and 10"	2

ITEM	DESCRIPTION-------SIZE	NUMBER
Hammer	Ripping, 20 ounces	2
Planes	Jack, 15"	2
Saws	Miter saw, 10 points	1
Saw sets	(For circular saws)	2
Squares	Try and mitre, 8"	2
Tapes	Return tape, 12'	2
Rules	Extension rule, 6'	2
Tape	Steel tape, 100'	2
Bob	Pumb bob, 12 ounces	4
Levels	Carpenters level (18" and 24")	1
Chalkline	Self chalking, 50'	2
Divider	Wing, 10"	1
Calipers	One each inside and outside, 6"	2
Files	Bastard, flat (2 each of 8" and 10")	4
Files	Bastard, half round, 8" and 10"	2
Files	Bastard, round, 8" and 10"	2
Files	Slim taper, 6"	2
Files	File handles, assorted sizes	24

Miscellaneous Woodworking Tools

Paint brushes	Medium (One each of 2", 3", 4")	3
Glass cutter		2
Wirebrushes	7 1/4" x 2 7/8"	2
Vises	Woodworking 4" x 10" jaws, open 12"	3

Metal Work

Hot and Cold

Anvil	Steel - 100 lbs.	1
Chisels	Cold, 1/4", 3/8", 1/2", 5/8", 3/4", 1"	6
Punches	Center punch 1/2" x 6"	3
Punches	Machine punch 5/8" x 7"	2
Punches	Line-up punch 1/4" & 5/8" x 12"	2
Hammers	Ball peen (one each of 12, 20, and 24 ounces)	3
Hammer	Blacksmith, 40 ounces	1
Hammer	Sledge hammer, 10 lbs.	1

ITEM	DESCRIPTION---------SIZE	NUMBER
Clippers	Bolt clipper, one large and one small	2
Hardie	Blacksmith's 1" (fit anvil)	1
Vises	Machinist Vise, swivel base, 5"	2
Tongs	Blacksmith's, straight lip 24"	set
Tongs	Blacksmith's, capacity 1 1/2"	set
Taps and dies	Screw plate, NC and NF, 1/4" to 1" by 16ths	set
Screw extractors	Nos. 1, 2, 3, 4, 5, 6	set
Forge	Gas fired with safety valve	1

Welding Equipment

Grinder	General purpose bench, 1/4 hp motor	1
Grinder	Wet grinder bench model 1/4 hp motor	1
Grinder	Sickle grinder, 1/4 hp motor	1
Hammers	Chipping hammers	4
Brushes	10" handle	6
Gloves	Leather	6
Goggles	Chipping and grinding goggles, cup type	6-10
Goggles	Welding goggles, cup type	1*
Helmets	Welding helmets	1*
Torch	Carbon arc	1
Curtain	Welding curtain for welding area	1

Sheet Metal

Torch	Propane torch, tips and tank	1
Mallets	Tinner's mallet 2 1/2" x 6"	2
Snips	Tinner's snips, straight and curved	2
Soldering iron	Electric, removable tips, 300 watt	1
Rivet kit	Includes tools and rivets	1
Hammer	Riveting hammer, 12 ounces	1
Seamer	Handy seamer, 3 1/2" blade	1
Groover	Hand groover, 3/8"	1

* One for each student

Farm Tractors, Engines and Machinery

Tools in this section are suggested for a small working group, three to five students, and are to be placed in a cabinet for tractor and machinery repair. One cabinet for every three or four students is desirable.

ITEM	DESCRIPTION---------SIZE	NUMBER
Hammer	Ball peen, 16-20 ounces	1
Punches	Center punches	set
Chisels	5/16"-1 1/2"	set
Gauges	Thickness gauges, .003"-.015"	set
Pliers	One each: needle nose, diagonal cutting, channel lock and vise-grip	4
Screwdrivers	Machine, 6", 8", 12"	set
Wrenches	Socket and box-end combination 1/4", 3/8", 1/2"	set
Wrenches	Allen, (Hex-head)	set
Wrenches	Spark plug	set

Farm Tractors, Engines and Machinery

Tools in this section should be placed in a general (central) tool room or cabinet.

Trolley	Trolley for I-beam, 3 tons	1
Jack	Hydraulic, 3 tons	1
Jack stands	Two tons	2 pr.
Cans	Five gallon for kerosene	2
Cans	One gallon for gasoline	2
Can	With top for water, 15-25 gal.	1
Cans	Oilers, 1/3-1/2 pint	4
Creeper	(For getting under machines)	1
Grease guns	Pressure lever type, 16 ounces	2
Gauges	Spark plug, wire type	2 sets
Light	Timing light	1
Charger	Battery charger	1
Cable	Jumper cable	1
Pliers	Combination, 6"	4
Screwdrivers	Off-set	2
Service light	Heavy cord 25', bulb shield	1
Tire gauge	Heavy duty	1
Puller set	Gear and bearing puller, 3 sets of jaws	1
Wrench	Torque, 1/2", 0-150 ft. lb.	1

ITEM	DESCRIPTION---------SIZE	NUMBER
Wrenches	Ignition	set
Wrenches	Flexible socket	set
Wrenches	Deep socket	set
Wrenches	3/4" drive, socket	set
Wrenches	Impact, electric	1
Punches	Gasket punches	set
Pick-up	Pick-up tool, magnetic	1
Tester	Battery tester	1

Small Gasoline Engines

Wrenches	Open end, 5/16" to 1" by 16ths	set
Wrenches	Box end, 5/16" to 1" by 16ths	set
Screwdrivers	Standard, 4", 6", 8"	1 ea.
Screwdrivers	Phillips, 4"-6"	1 ea.
Screwdrivers	Offset, 4"-6"	1 ea.
Chisel	Cold, flat and cape	set
Punches	Assorted	set
Pliers	Needle nose	4
Pliers	Combination	4
Pliers	Water pump	2
Pliers	Vise grip	2
Hammer	Ball peen, 16 ounces	3
Wrench	Adjustable, 8"	1
Wrench	Adjustable, 10"	1
Hammer	Plastic	3
Gauge	Feeler, 26 blades	2
Gauge	Spark plug, wire	2
Tool	Ignition tool set	1
Bar	Pry, 18"	1
Wrench	Set 3/8" drive, socket wrenches with 13/16" deep socket	set
Wrench	Pipe 18"	1
Oiler	Hand	1
File	Flat, 8"	3
Brush	Wire, hand	3
Knife	Putty	3
Screwdriver	Hex	set
Wrench	Torque, 3/8" drive, 0-600 in. lbs.	1
Light	Trouble	2

Power Tools and Large Equipment

ITEM	DESCRIPTION---------SIZE	NUMBER
Drill	Portable, electric 1/4"	1
Drill	Portable, electric 3/4"	1
Grinder	Portable grinder, 1" x 6" with attachment for drill bits and chisels	1
Dresser	Wheel dresser	1
Drill bits	High speed, 1/16"-1/2" by 64ths, 1/2"-1" by 8ths	set
Saw	Portable, heavy duty, 7" blade	1

Miscellaneous Tools and Equipment

Fire blanket	(Safety item in shop)	1
Fire extinguisher	CO_2, 10 lbs. size	1
First aid center	Assortment of needs	1
Chain detacher		1
Step ladder	2 sections, 30'	1
Level	Bostrum level, utility	1
Lettering set	(For marking tools) 1/8" letters	1

CONSUMABLE SUPPLIES

This list contains some of the consumable supplies that should be available in the farm mechanics shops.

Arc Welding

Steel electrodes	1/8" and 5/32"	100 lbs.
Cast electrodes	1/8"	10 lbs.
Carbon rods	3/16" and 3/8" x 6" cored and copper coated	12
Steel metal	Scrap steel 1/4" thick, 4" wide, 12' long	500 lbs.

Oxy-acetylene Welding

Steel rods	Mild steel oxy-acetylene filler rods, 1/16", 1/8", 3/32"	40 lbs.
Cast rods	Cast iron oxy-acetylene filler rods 1/8"	5 lbs.

ITEM	DESCRIPTION---------SIZE	NUMBER
Bronze rods	Bronze oxy-acetylene filler rods, 1/16", 1/8", 3/32"	15 lbs.
Steel bar	Mild steel bar 1/8" x 1"	100'
Rods	Assortment of hardfacing	Assort.
Flux	Flux for cast iron and brazing	5 lbs.
Flints	Igniter flints	12

Sheet Metal

Metal sheets	Galvanized steel sheets, 4' x 4' 28 gauge	4
Metal sheets	Stainless steel 1' x 4', 28 gauge	4
Screws	Sheet metal, 1/2" No. 4	5 lbs.
Solder	Solder, bar 50-50	2 lbs.
Solder	Solder, spool, acid and rosin core	2 lbs.

Machinery

Cleaning fluid	Kerosene and gasoline	25 gal.
Rags	Cleaning rags	100 lbs.
Grease	Hi-pressure	50 gal.
Oil	S. A. E. 20-30	10 gal.
Oil	Penetrating	1 gal.
Oil	Household - light	1 gal.
Compound	Valve grinding compounds	1 lb.
Cotter keys	3/4"-2"	Assort.
Bolts	Machine bolts	Assort.
Bolts	Machine screw bolts and nuts	Assort.
Nuts	NC and NF	Assort.
Washers	Lock washers	Assort.

Woodwork

Nails	Common, various sizes	60 lbs.
Nails	Finishing, various sizes	40 lbs.
Brads	Assortment of various sizes	5 lbs.
Bolts	Carriage bolts	Assort.
Bolts	Lag bolts (screw)	Assort.

ITEM	DESCRIPTION-------SIZE	NUMBER
Bolts	Stove	Assort.
Nuts	Square	Assort.
Hinges	Various kinds and sizes	Assort.
Washers	Plain, various sizes	Assort.
Fasteners	Corrugated, various sizes	Assort.
Screws	Various sizes and kinds	Assort.
Paint	Paint and varnish remover	1 gal.
Turpentine	Turpentine or thinner	1 gal.
Paper	Sandpaper, various sizes	Assort.
Brushes	Paint brushes, various sizes	Assort.
Glue	Casein powder or casein base liquid	4 lbs.
Miscellaneous		
Blades	Hack saw blades	12
Blades	Extras for power saws	sev.
Blades	For horizontal power bandsaw, metal cutting	6
Blades	Extra handles for various tools	
Cloth	Emery cloth	
Wool	Steel wool	
Steel	Mild steel, flats and rounds, various sizes	Assort.
Putty	(For glazing)	5

III. EXPLANATORY NOTES

1. Portable welding screens to shield welding area from rest of shop. These can be removed and stored to increase working space when welding is not being taught.

2. Exhaust system of movable, individual hoods should be used to remove smoke and fumes. This system can be extended and adapted to remove the exhaust fumes from the internal combustion engines used in these classes.

3. Compressed air should be available throughout the shop and work areas.
   (a) 1 quick-connect air outlet every 20' around the shop
   (b) 1 quick-connect air outlet in paved area

4. Water connections:
   (a) 1 hose connections inside shop near overhead door
   (b) 2 hose connections in concrete paved area for washing and steam cleaning operations

LABORATORY STORAGE

I. Tool room

   1. Wall panels, bins or cabinets for storage of special tools, tool sets, portable tools and other equipment

   2. Tool room should be secured

II. Supplies storage

   1. Can be included in the tool room if necessary

   2. Bins and/or locked cabinets for consumable supplies and other specialized items

OUTSIDE PAVED AREA

1. The area outside of overhead door where washing and steam cleaning operations are carried out must be paved with concrete and supplied with adequate drains to carry off waste water. Asphalt must not be used in this area due to the fact that the asphalt will be broken up by the effects of grease, oil and steam. The remainder of the area can be paved with asphalt or concrete as desired.

2. Entire area should be fenced with 8' high chain link fence with one 16' wide gate and other gates as needed. Provisions should be made to secure area during out of school hours.

3. Loading ramp constructed of concrete, 4' high, 14' wide and at least a 4' x 14' level area at top, with a down slope of 4" per foot, length of slope will be determined by land topography where the ramp is constructed.

ELECTRICAL REQUIREMENTS

The section will outline in general terms the electrical requirements of the various areas of the facility.

1. Classroom
   (a) 1 - 110 v., 20 amps. polarized duplex outlet every 10' around classroom

2. Teacher office
   (a) 2 - 110 v., 20 amps. polarized duplex outlets

3. Classroom storage
   (a) 2 - 110 v., 20 amps. polarized duplex outlets

4. Library
   (a) 2 - 110 v., 20 amps. polarized duplex outlets

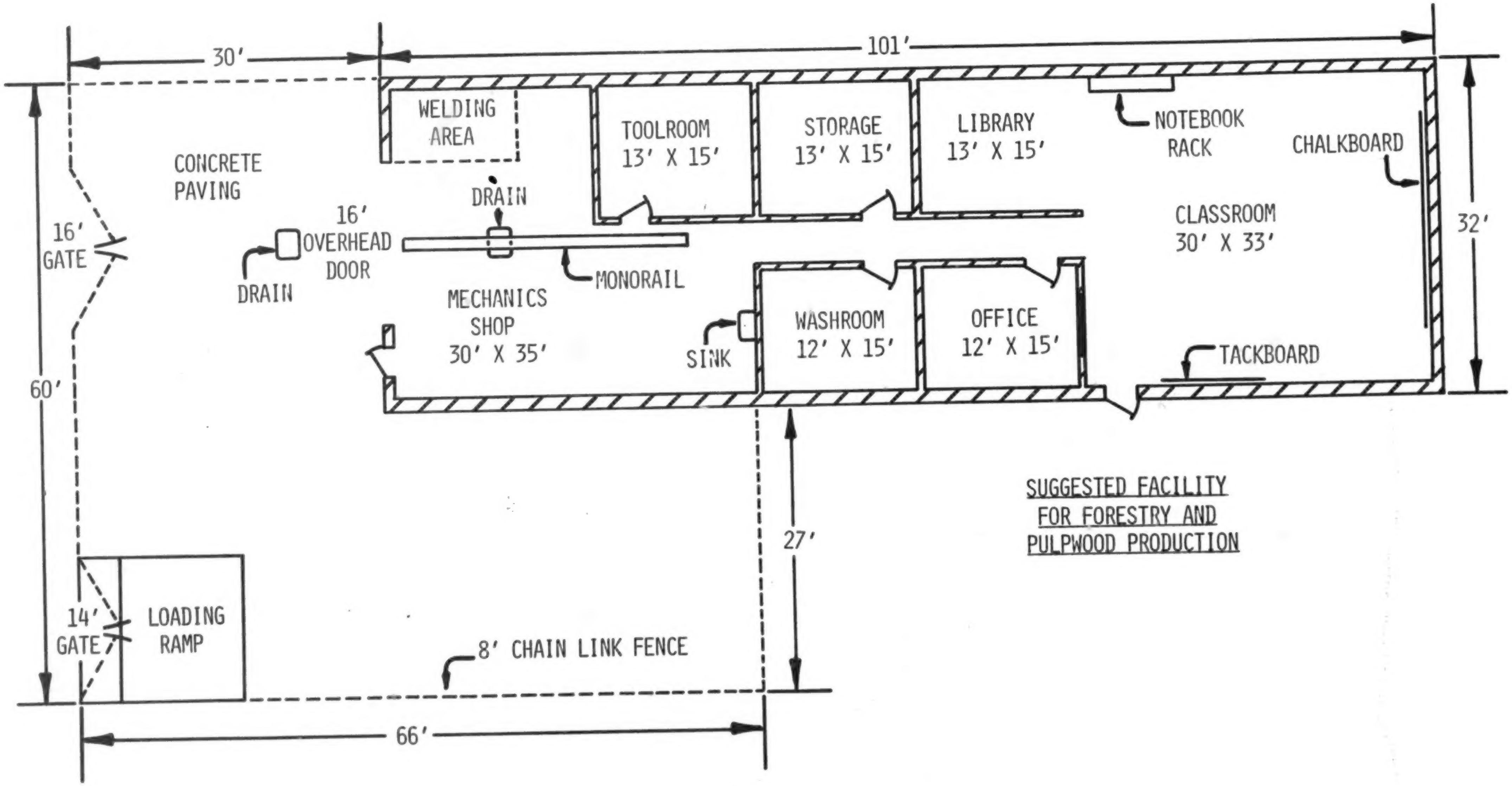
5. Laboratory
    - (a) 1 - 110 v., 20 amps. polarized duplex outlet every 10' around laboratory area
    - (b) 1 - 220 v., outlet every 10' around laboratory area
    - (c) 4 - 220 v., welder outlets, 2 in welding area, 2 in other shop areas
    - (d) 1 - Buss bar, centered in shop and running the length of it to allow for flexibility in locating stationary equipment and to provide adequate electrical power in all areas of the mechanics laboratory

6. Tool room
    - (a) 1 - 110 v., 20 amps. polarized duplex outlet

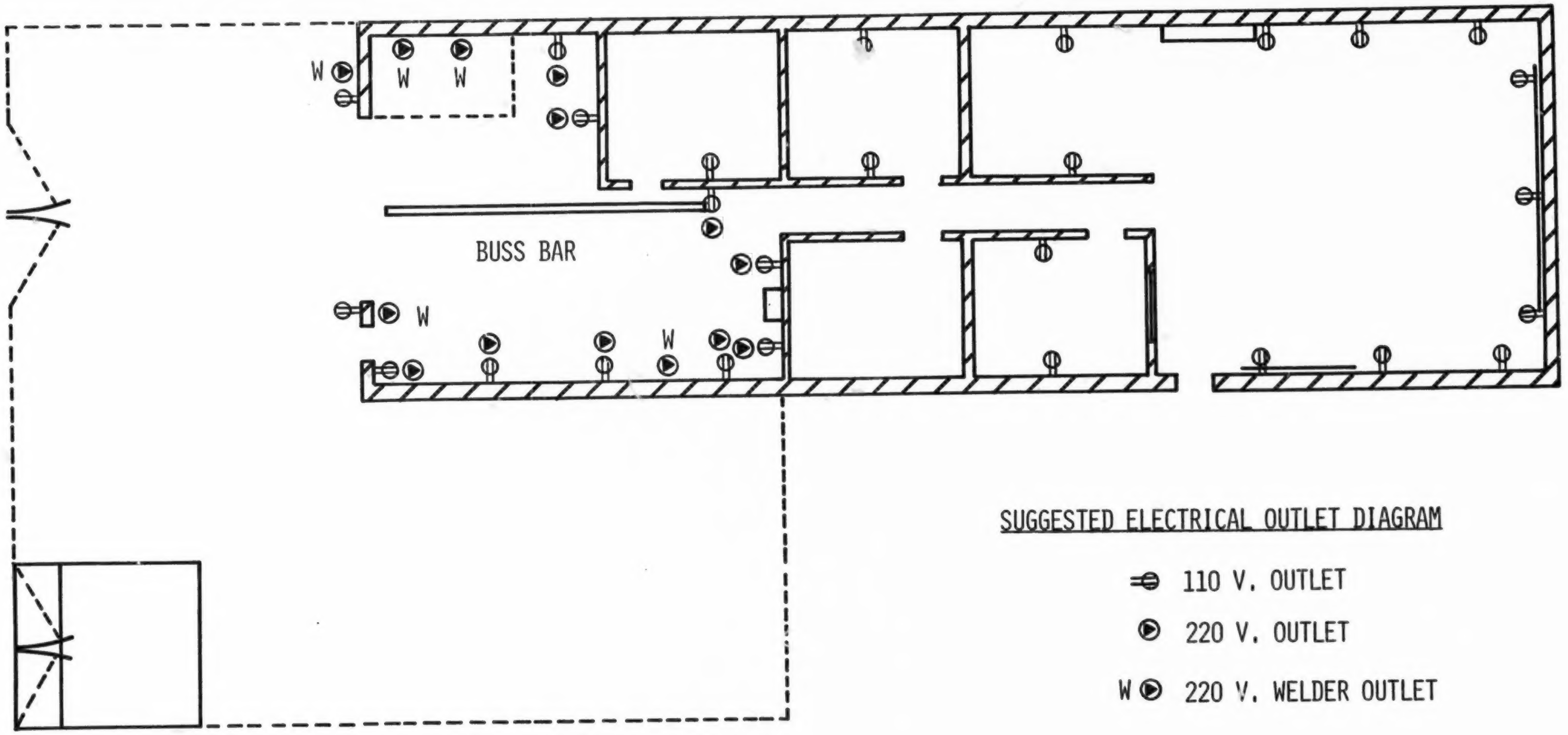
7. Outside paved area
    - (a) 2 - 110 v., 20 amps. weatherproof polarized duplex outlets
    - (b) 1 - 220 v., weatherproof welder outlet

SUGGESTED PLANS

The last part of this section consists of suggested floor plans for this facility. These plans include all areas previously outlined and contain details of certain sections for clarity. There is an electrical diagram consisting of the recommended numbers of outlets, size and location. Number, size and type of lighting will be determined by state specifications and will conform to the type selected for use in the remainder of the school building.


30′
101′
32′
WELDING AREA
TOOLROOM 13′ X 15′
STORAGE 13′ X 15′
LIBRARY 13′ X 15′
NOTEBOOK RACK
CHALKBOARD
CLASSROOM 30′ X 33′
CONCRETE PAVING
16′ GATE
16′ OVERHEAD DOOR
DRAIN
DRAIN
MONORAIL
MECHANICS SHOP 30′ X 35′
SINK
WASHROOM 12′ X 15′
OFFICE 12′ X 15′
TACKBOARD
60′
27′
14′ GATE
LOADING RAMP
8′ CHAIN LINK FENCE
66′

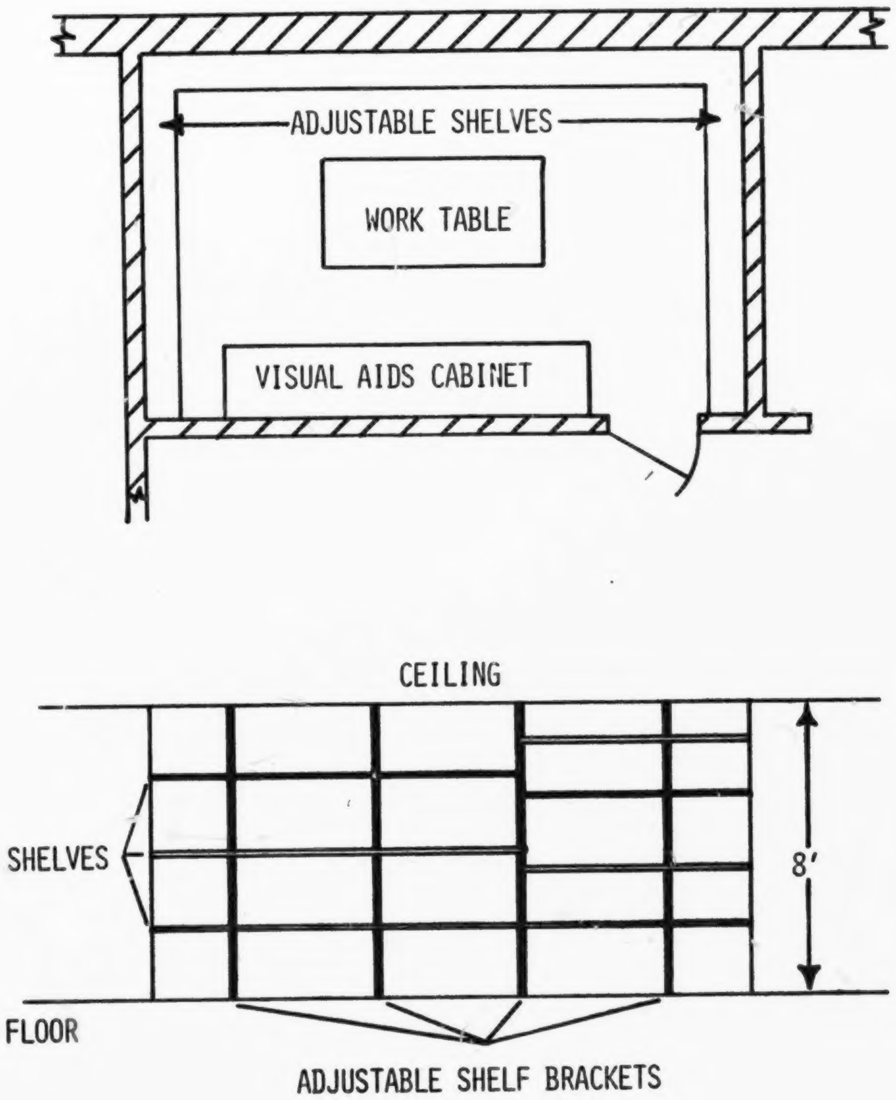
SUGGESTED FACILITY
FOR FORESTRY AND
PULPWOOD PRODUCTION


W
W
W
BUSS BAR
W
W
=⊖ 110 V. OUTLET
● 220 V. OUTLET
W ● 220 V. WELDER OUTLET

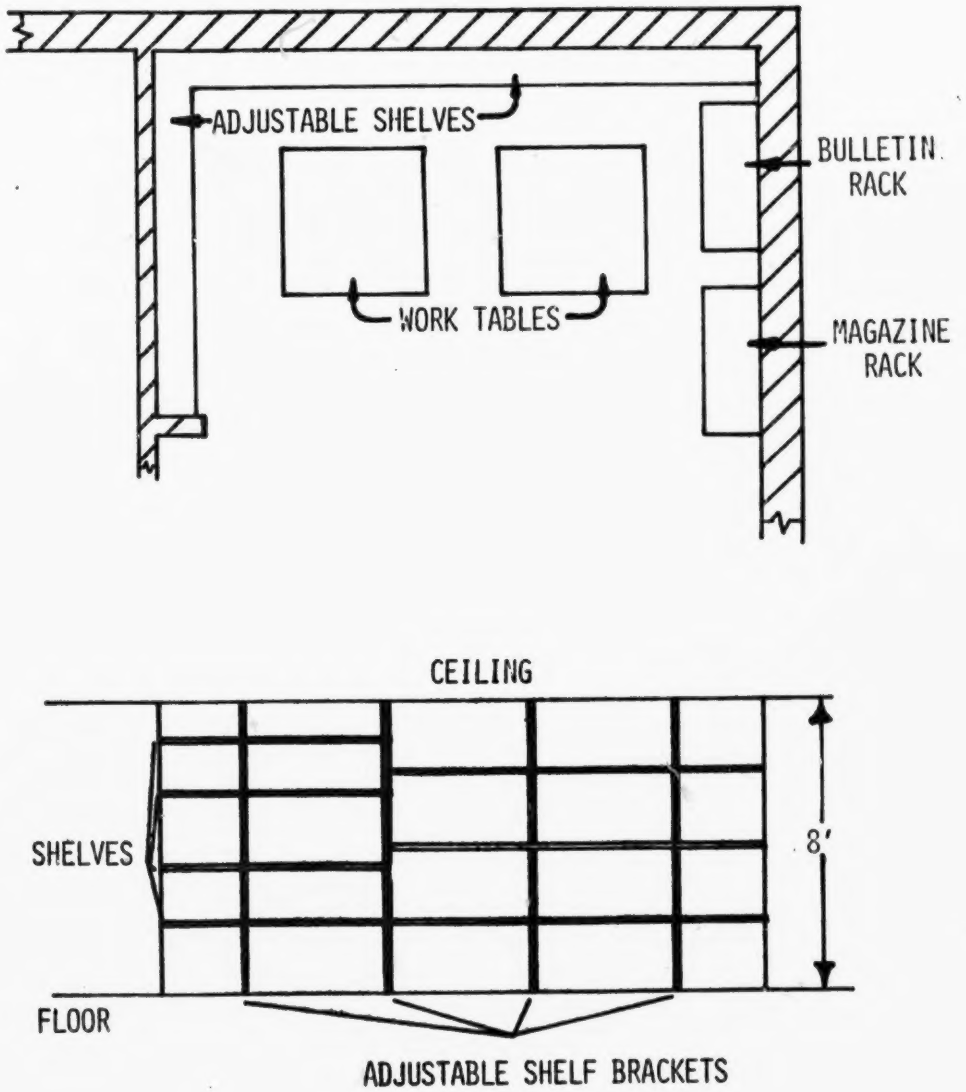
SUGGESTED ELECTRICAL OUTLET DIAGRAM

SUGGESTED ARRANGEMENT FOR CLASSROOM STORAGE AND LIBRARY

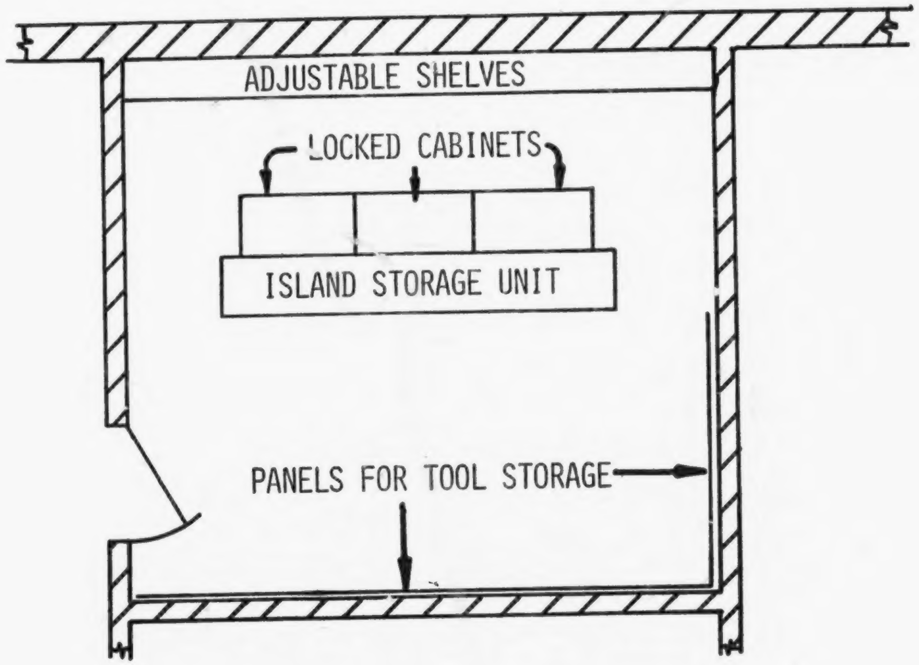
STORAGE

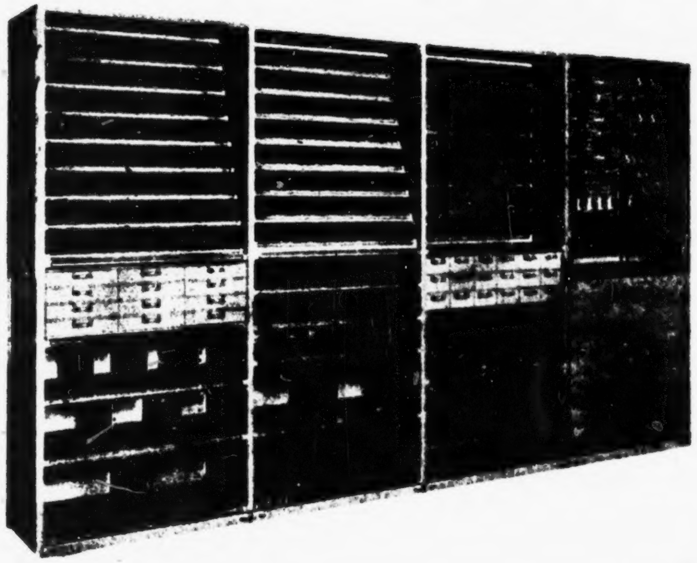

ADJUSTABLE SHELVES
WORK TABLE
VISUAL AIDS CABINET
CEILING
SHELVES
8′
FLOOR
ADJUSTABLE SHELF BRACKETS

LIBRARY

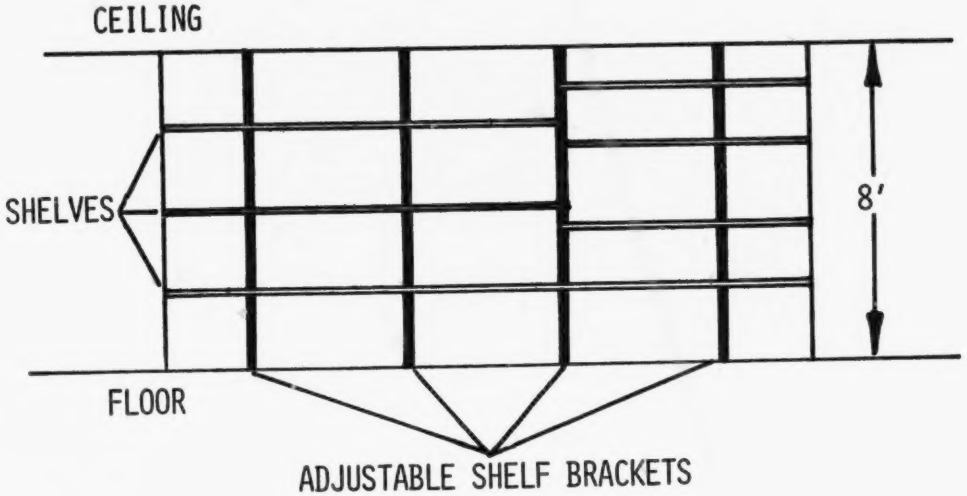

ADJUSTABLE SHELVES
BULLETIN RACK
WORK TABLES
MAGAZINE RACK
CEILING
SHELVES
8′
FLOOR
ADJUSTABLE SHELF BRACKETS

SUGGESTED ARRANGEMENT FOR SHOP STORAGE AND TOOLROOM

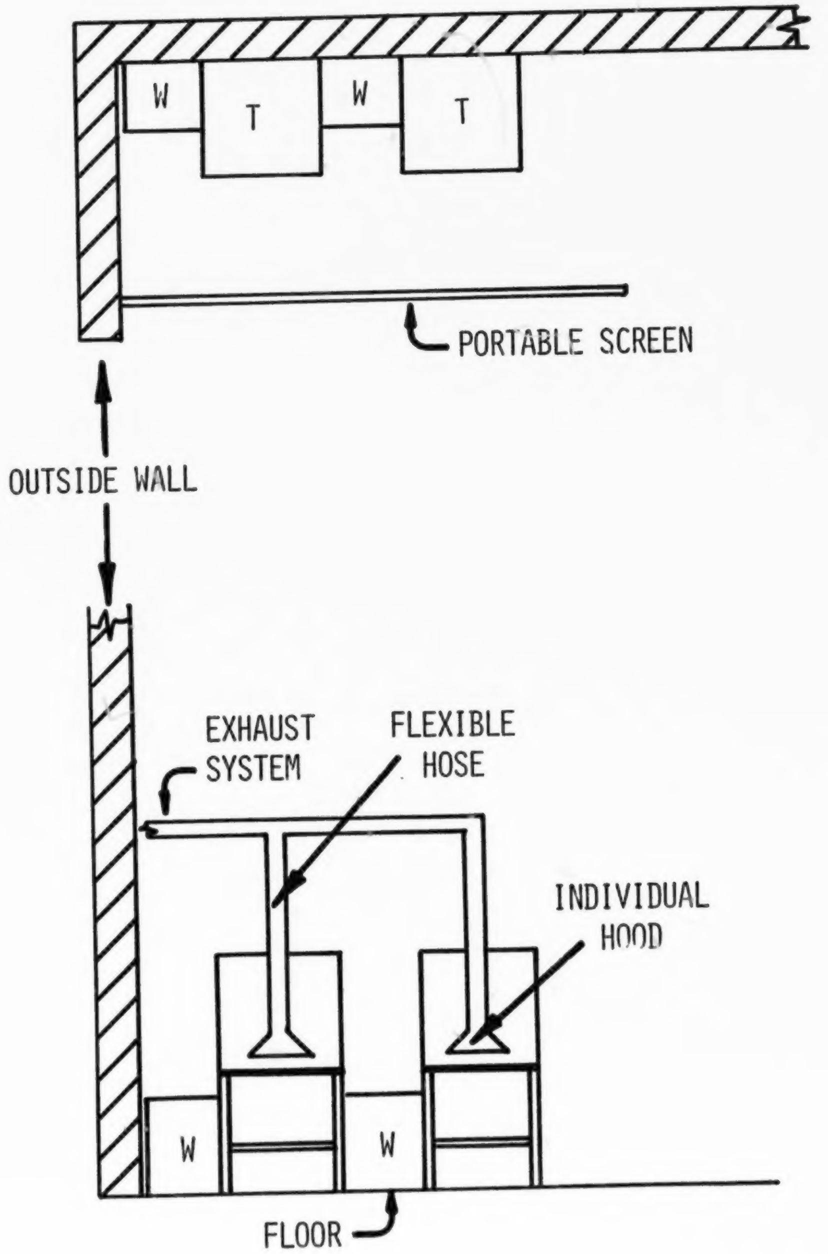

ADJUSTABLE SHELVES
LOCKED CABINETS
ISLAND STORAGE UNIT
PANELS FOR TOOL STORAGE



EXAMPLE OF ISLAND TYPE STORAGE UNIT

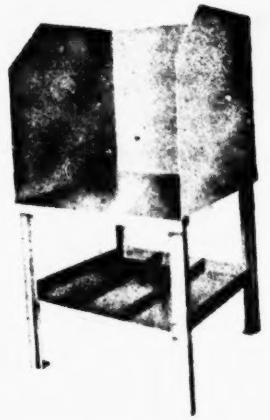

CEILING
SHELVES
8'
FLOOR
ADJUSTABLE SHELF BRACKETS

SUGGESTED ARRANGEMENT FOR WELDING AREA


W
T
W
T
PORTABLE SCREEN
OUTSIDE WALL
EXHAUST SYSTEM
FLEXIBLE HOSE
INDIVIDUAL HOOD
W
W
FLOOR

W-ARC WELDER

T-WELDING TABLE



EXAMPLE OF TYPE OF WELDING TABLE